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Civil Engineering Programming

AIRFIELD AND HELIPORT PLANNING CRITERIA

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**DEPARTMENTS OF THE AIR FORCE,
THE ARMY AND THE NAVY**

Civil Engineering Programming

AIRFIELD AND HELIPORT PLANNING CRITERIA

This publication provides standardized criteria for all Department of Defense (DOD) Service components for planning and developing the layout of runways, taxiways, aprons, and related facilities for airfields and heliports. It provides criteria for establishing planes and surfaces of navigational airspace surrounding these airfields and heliports. For purposes of these standards, an airfield refers to fixed-wing aircraft facilities, and a heliport refers to rotary-wing aircraft facilities. Criteria in this publication apply to installations in the United States, its territories, trusts, and possessions, and unless otherwise noted, to installations overseas on which the United States has vested base rights.

Part One contains general information, policies, and responsibilities.

Part Two covers airfield layout and airspace criteria for fixed-wing aircraft facilities.

Part Three provides heliport layout and airspace criteria for rotary-wing aircraft facilities.

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PART ONE

GENERAL INFORMATION, POLICIES, AND RESPONSIBILITIES

Chapter 1

GENERAL INFORMATION

1-1. Scope. Standards in this part pertain to land-based military installations under DOD control. DOD tenant organizations on civil airports use these standards to the extent practical, otherwise, Federal Aviation Administration (FAA) criteria apply. These standards give dimensions, clearances, and grades for airfield or heliport operational areas, as well as geometric configurations and slopes of the surrounding airspace. Army and Navy design and planning standards in Army manual TM 5-803-4 and Navy documents (NAVFAC DM-21, P-80, and P-272) include the standards in this document and provide other standards that are essential to planning and designing additional airfield and heliport facilities. Additional criteria and guidance for the Air Force, are in AFM 86-2 and 86-8. Federal Aviation Regulation (FAR), part 77, contains supplemental material on objects that affect navigable airspace. The United States Standard for Terminal Instrument Procedures (TERPs) (TM 95-226, OPNAVINST 3722.16C, AFM 55-9) provides additional criteria to be considered when designing or modifying airfields and facilities on airfields that are used under instrument flight rules (IFRs).

1-2. Minimum Standards. These criteria are considered to be the basic essential safe standards for planning and developing new airfield and heliport facilities to meet the sustained operations of assigned missions. These criteria apply to installations in the United States, its territories, trusts, and possessions, and unless otherwise noted, to installations overseas on which the United States has vested base rights.

1-3. Implementation of International Military Standards. Some of the material in this publication is also included in standards of the Air Standardization Coordinating Committee (ASCC)-known as ASCC Standards-and standards of the North Atlantic Treaty Organization (NATO), known as NATO Standardization

Agreements (STANAGs). These standards should be reviewed before proposing significant changes to criteria in this publication.

1-4. Applicability to Existing Construction. The standards in this document are not intended for existing facilities located or constructed under previous standards that can be continued in use without impairing operational efficiency and safety. Existing facilities, constructed under previous or emergency standards, need not be modified nor expanded just because they do not conform to these requirements. When existing facilities are modified, and it is feasible to do so, construction must conform to the standards established in this document.

1-5. Theater-of-Operations. This publication may be used as a guide for designing theater-of-operations facilities if prolonged use may be expected. Standards for theater-of-operations installations are in the following documents of the DOD Service component that applies: Army TM 5-330 and Air Force AFM 86-3, volume II.

1-6. Responsibilities. The DOD Service component responsible for planning, designing, and constructing airfields and heliports must conform with the basic criteria of this document. DOD Service components may supplement or amplify this material, because unique operational aspects of an individual Service are not covered in this publication.

1-7. Waivers to Criteria. Each DOD Service component is responsible for setting administrative procedures necessary to process and grant formal waivers to permit deviations from criteria in this document. If a waiver to these criteria affects instrument approach and departure procedures in (TERPs), the DOD Service component processing the waiver must coordinate its action with the applicable TERP waiver approving authority.

PART TWO

FIXED-WING AIRCRAFT

Chapter 2

AIRFIELD LAYOUT CRITERIA

2-1. General Information. This part uses the same runway classification system established by the Office of the Secretary of Defense as a means of defining accident potential areas (zones) for the Air Installations Compatible Use Zones (AICUZ) Program. Class A runways (table 2-1) are primarily intended for small light aircraft that do not have the potential for development to heavy aircraft use or for which no foreseeable requirement for such use exists. Ordinarily, these runways have less than 10 percent of their operations that involve aircraft in the Class B category (table 2-1), and are less than 8,000 feet

long. Class B runways are all other fixed-wing runways. These runway classes are not to be confused with aircraft approach categories in other DOD or FAA documents, nor pavement traffic areas as designated by the Air Force.

2-2. Layout Criteria. Tables 2-2 through 2-8 give the principal airfield dimensional, clearance, and grading criteria for airfield layouts used to support fixed-wing aircraft operations. These criteria are illustrated in figures 2-1 through 2-7.

Table 2-1. Runway Classification by Aircraft Type.¹

Class A Runways		Class B Runways		
C-1	O-2	A-3	C-123	F-100
C-2	OV-1	A-4	C-130	F-101
C-4	OV-10	A-5	C-131	F-104
C-6	S-2	A-6	C-135	F-105
C-7	T-28	A-7	C-137	F-106
C-12	T-34	A-8	C-140	F-111
C-45	T-41	A-10	C-141	P-2
C-47	T-42	A-18	E-3	P-3
C-117	T-44	AV-8	E-4	S-3
E-1	U-10	B-1	F-4	SR-71
E-2	U-11	B-52	F-5	T-2
O-1	U-21	B-57	F-8	T-29
	UV-18	C-5	F-14	T-33
		C-9	F-15	T-37
		C-10	F-16	T-38
		C-14	F-17	T-39
		C-15	F-18	TR-1
		C-118		U-2
		C-121		

¹Only symbols for basic mission aircraft or basic mission aircraft plus type are used. Designations represent entire series. Runway classes in this table are not related to aircraft approach categories or to pavement design classes or types.

Table 2-2. Runways.

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
1	Length			For computation of runway lengths, see documents of the appropriate DOD Service component. Army: TM-803-4, Navy: NAVFAC P-80, and Air Force: AFM 86-2.
2	Width	75 ft		Navy and Marine Corps airfields may be modified to meet training requirements.
			150 ft	Air Force Fighter aircraft including trainers.
			200 ft	Air Force aircraft not otherwise specified and Navy and Marine Corps aircraft.
			300 ft	B-52 aircraft. For additional Air Force requirements see AFM 86-2.

Table 2-2. Runways Continued.

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
3	Width of shoulders	25 ft		Adjacent to the longitudinal edges of runways.
			150 ft	Navy and Marine Corps installations.
			200 ft	Air Force installations.
4	Longitudinal grades of runway and shoulders	Max 1.0%		Hold to minimum practical. Exception for shoulders: A 3.0 percent maximum is permitted where arresting barriers are installed.
5	Longitudinal runway grade changes	Max 0.167% per 100 linear feet of runway		Exceptions: 0.4 percent for edge of runways at runway intersections. Maximum rate of longitudinal grade change is produced by vertical curves having 600 foot lengths for each percent of algebraic difference between the two grades. If more than one grade change occurs, the distance between two successive points of intersection (PI) will be no less than 1,000 feet and two successive distances between PIs will not be the same. No grade change is to occur less than 3,000 feet from the runway end for Class B runways and no less than 1,000 feet for Class A runways.
6	Transverse grade of runway	Min 1.0% Max 1.5%		From centerline of runway. Selected slope is to remain constant for length of runway, except at runway intersections where pavement surfaces must be warped.
7	Transverse grade of shoulder	5.0% first 10 feet followed by 2.0% Min to 3.0% Max	Min 2.0% Max 3.0% Unpaved shoulders may be increased to 5% for first 10 ft	Slope from runway pavement.
8	Runway lateral clearance distance (primary surface)	500 ft	1000 ft *	Measured perpendicularly [from centerline] of runway. This distance is to be clear of fixed and mobile obstacles. New construction will comply with these criteria. However, at airfields where the lateral clearance distance has been established according to the previous 750 foot criteria, the 750-foot distance may remain. In addition to the lateral clearance criterion, the vertical height restriction on structures and parked aircraft as a result of the 7 to 1 transitional slope must be taken into account. See chapter 3, section C. (1) Fixed obstacles include manmade or natural features such as buildings, trees, rocks, terrain irregularities and any other features constituting possible hazards to moving aircraft. Siting exceptions for navigational aids and meteorological facilities are in documents of the appro-

*For military installations overseas, other than bases located in the United States, its territories, trusts, and possessions, apply to the maximum practical extent.

Table 2-2. Runways Continued.

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
				<p>appropriate DOD Service component. Army: TM 5-803-4, Navy: NAVFAC P-80, and Air Force: AFM 86-8.</p> <p>(2) Parallel taxiways for Navy and Marine Corps airfields may be located within the lateral clearance distance. For Army and Air Force airfields, parallel taxiways (exclusive of shoulder width) must be located in excess of the lateral clearance distance.</p> <p>(3) For Class A runways, except at Navy and Marine Corps airfields, above ground drainage structures, including headwalls, are permitted 300 feet or beyond from the runway centerline. For Class B runways, except at Navy and Marine Corps airfields, aboveground drainage structures, including headwalls, are permitted 300 feet or beyond from the runway edge. At Navy and Marine Corps airfields, aboveground drainage structures shall be individually reviewed. Drainage slopes of up to a 10 to 1 ratio are permitted for all runway classes, but swales with more gentle slopes are preferred.</p> <p>(4) For Navy and Marine Corps airfields, taxiways may be located within the primary surface at least 500 feet from centerline of runway to centerline of taxiway.</p> <p>(5) Mobile obstacles include parked aircraft, parked and moving vehicles, railroad cars, and similar equipment. Taxiing aircraft and emergency vehicles are exempt from this restriction.</p>
9	Longitudinal grades within primary surface	Max 10.0%		Exclusive of pavement, shoulders and cover over drainage structures. Slopes are to be gradual as practicable. Avoid abrupt changes or sudden reversals. Rough grade to the extent necessary to prevent damage to aircraft in the event of erratic performance.
10	Transverse grades within primary surface (in direction of surface drainage)	Min of 2.0% prior to channelization * * Max 10.0%		Exclusive of pavement, shoulders and cover over drainage structures. Slopes are to be gradual as practicable. Avoid abrupt changes or sudden reversals. Rough grade to the extent necessary to prevent damage to aircraft in the event of erratic performance.
11	Distance between centerlines of parallel runways	Not applicable	1,000 ft	Visual flight rules (VFR) without intervening parallel taxiway.
			2,075 ft	VFR with intervening parallel taxiway.
			4,300 ft	Instrument flight rules (IFR) using simultaneous approaches.

**Bed of channel may be flat.

Table 2-2. Runways Continued.

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
12	Sight distance	Min 3,000 ft Any two points 5 ft above the pavement must be mutually visible for the distance indicated	Min 5,000 ft Any two points 8 ft above the pavement must be mutually visible for the distance indicated	

Table 2-3. Taxiways.

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
1	Width	40 ft	75 ft	May be modified for particular mission requirements (that is, high speed and end turn-off taxiways).
2	Width of shoulders	25 ft	50 ft	
3	Longitudinal grade of taxiway and shoulders	Max 3.0%		For Navy and Marine Corps airfields, a maximum of 2.0 percent is recommended when jet aircraft are required to accelerate from a standing position. For Air Force airfields other than multi-mission, a gradient exception of 5.0 percent is permitted for a distance of not more than 400 feet. The exception does not apply within 600 feet of a runway entrance. Here the 3.0 percent maximum applies. For Air Force multimission airfields, the gradient is limited to 1.5 percent.
4	Rate of longitudinal grade change per 100 feet	Max 1.0%		The minimum distance between two successive points of intersection (PI) is 500 feet. Changes are to be accomplished by means of vertical curves.
5	Transverse grade of taxiway	Min 1.0% Max 1.5%		From centerline of taxiway.
6	Transverse grade of shoulders	5.0% first 10 ft followed by Min 2.0% Max 4.0%	Min 2.0% Max 4.0%	Grades for unpaved taxiway shoulders for Class B runways may be increased to 5.0 percent for the first 10 feet. Paved shoulders for B-52 aircraft will have a minimum grade of 1.5 percent and a maximum grade of 2.0 percent.
7	Sight distance	Not applicable	Min 2,000 ft Between eye level at 7 ft and an object 10 ft above taxiway pavement	For Air Force taxiways, 1,000 feet between any two points 10 feet above taxiway pavement.

Table 2-2. Taxiways Continued.

Item No.	Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
8	Clearance from taxiway centerline to fixed or mobile obstacles (taxiway clearance line)	100 ft min	150 ft min	Air Force airfields.
			200 ft min	
9	Grade (area between taxiway shoulder and taxiway clearance line)	Min of 2.0% prior to channelization* Max 10.0%		Any direction. Rough grade to the extent necessary to prevent damage to aircraft in the event of erratic performance.

*Bed of channel may be flat.

Table 2-4. Aprons.

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
1	Size and configuration	Variable For apron types and space requirements, see documents of the appropriate DOD Service component: Army TM 5-803-4, Navy NAVFAC P-80, and Air Force AFM 86-2		As a general rule there are no standard sizes for aprons. They are individually designed to support specific aircraft uses. The detailed dimensions are determined by the number and type of aircraft involved, the function of the apron, the maneuvering characteristics of the aircraft and the degree of unit integrity to be maintained. Other determinates are the physical characteristics of the site, relationship of the apron area to other airfield facilities and the objective of the comprehensive plan.
2	Grades in the direction of drainage	Min 0.5% Max 1.5%		Avoid surface drainage patterns with numerous or abrupt grade changes that can produce excessive flexing of aircraft and structural damage.
3	Width of shoulders	50 ft		For Navy and Marine Corps airfields and Air Force installations that accommodate B-52, C-5, E-4, and Boeing 747 aircraft.
		25 ft		Army airfields and Air Force installations other than designated above.
4	Longitudinal grade of shoulders	Variable		Conform to longitudinal grade of the abutting primary pavement.
5	Transverse grade of shoulders	5.0% first 10 feet followed by 2.0% min to 4.0% max	Min 2.0% Max 4.0% Unpaved shoulders may be increased to 5.0% for the first 10 ft	Paved shoulders for B-52 aircraft will have a minimum grade of 1.5 percent and a maximum grade of 2.0 percent.

Table 2-4. Aprons Continued.

Item No.	Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
6	Clearance to fixed or mobile obstacles	75 ft		
			100 ft	Navy and Marine Corps airfields.
			125 ft	Air Force airfields.
7	Grades in cleared area beyond shoulders to fixed or mobile obstacles	Max 10.0%		

Table 2-5. Other Airfield Pavements.

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
1	Size, configuration and clearances	Variable For specific requirements, see documents of the appropriate DOD Service component. Army TM 5-803-4, Navy NAVFAC P-80, and Air Force AFM 86-2.		These pavements are relatively small areas, such as hangar access apron and stub aircraft parking apron, and others that serve such functions as aircraft power checks, arming and dearming, engine run-ups and compass calibration.
2	Grades in any direction	Same as for aprons table 2-4		Unless a particular mission requirement is otherwise.
3	Width of shoulders			
4	Grade of shoulders			

Table 2-6. Overruns.

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
1	Length	200 ft	1,000 ft	Length and width of stabilized or paved area to conform to criteria of the individual DOD Service component.
2	Width	Sum of runway and shoulders		
3	Longitudinal centerline grade	Same as last 1,000 ft of runway	First 300 ft same as last 3,000 ft of runway Remainder 1.5% Max	In order to avoid abrupt changes in grade between the first 300 feet and remainder of overrun of a Class B runway, the maximum change of grade is 2.0 percent per 100 linear feet.
4	Transverse grade	Min 2.0% Max 3.0%		From centerline of overrun. Transition from the runway and runway shoulder grades to the overrun grades to be made within the first 150 feet of overrun.

Table 2-7. Clear Zones. *

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
1	Length	3,000 ft	3,000 ft	Measured along the extended runway centerline beginning at the runway end. * *
2	Width	1,000 ft	3,000 ft	Centered on and measured at right angles to the extended runway centerline. Exceptions to these widths are permissible based on individual service analysis of highest accident potential area for specific runway use and acquisition constraints. Refer to figure 2-3. Accident Potential Zone Guidelines.
3	Longitudinal grade of area to be graded	Max 10.0%		The area to be graded is 1,000 feet in length by the established width of the primary surface. Grades are exclusive of the overrun, but are to be shaped into the overrun grade. The maximum longitudinal grade change cannot exceed ± 2.0 percent per 100 feet. The graded area is to be cleared and grubbed of stumps and free of abrupt surface irregularities, ditches, and ponding areas. No above-ground structures, * * * objects, or traverse ways are permitted in the area to be graded, but gentle swales, subsurface drainage, covered culverts and underground structures are permissible. The transition from the graded area to the remainder of the clear zone is to be as gradual as feasible. No part of either area can penetrate the approach-departure clearance surface. For policy regarding permissible facilities, geographical features, and land use in the remainder of the clear zone, refer to guidance furnished by each individual Service, and DOD Air Installations Compatible Use Zone (AICUZ) guidelines for clear zones and accident potential zones (attachment 3). For Navy and Marine Corps airfields, that area of the clear zone beyond the overrun and having the same width as the overrun must be cleared and graded to generally follow the overrun profile.
4	Transverse grade of area to be graded (in direction of surface drainage prior to channelization)	Min 2.0% Max 10.0%		

*Applicable to air installations of the Military Departments in the United States, its territories, trusts, and possessions. For military installations overseas, other than in locations designated, apply to the maximum practical extent.

**For the definition of runway end refer to the glossary, attachment 1.

***Essential Nav Aid structures excepted according to standards of individual DOD Service component.

Table 2-8. Accident Potential Zones (APZ).¹²

Item No.	Item Description	Class A Runway	Class B Runway	Remarks
		Requirement	Requirement	
1	APZ I Length	2,500 ft	5,000 ft	<p>APZ I starts at the end of the clear zone. APZ II starts at the end of APZ I. They are centered and measured on the extended runway centerline.</p> <p>Modifications will be considered if:</p> <ul style="list-style-type: none"> • The runway is infrequently used. • Prevailing wind conditions are such that a large percentage (that is, over 80 percent) of the operations are in one direction. • Local accident history indicates consideration of different areas. • Most aircraft do not overfly an APZ area as defined here during normal flight operations (modifications may be made to alter these zones and adjust them to conform to the line of flight). • Other unusual conditions exist.
2	APZ I Width	1,000 ft	3,000 ft	
3	APZ II Length	2,500 ft	7,000 ft	
4	APZ II Width	1,000 ft	3,000 ft	

¹Applicable to air installations of the Military Departments in the United States, its territories, trusts, and possessions. For military installations overseas, other than in locations designated, follow guidance of the individual Service component.

²For guidance on land use within the APZ's, see DOD Air Installations Compatible Use Zone (AICUZ) guidelines (attachment 3).

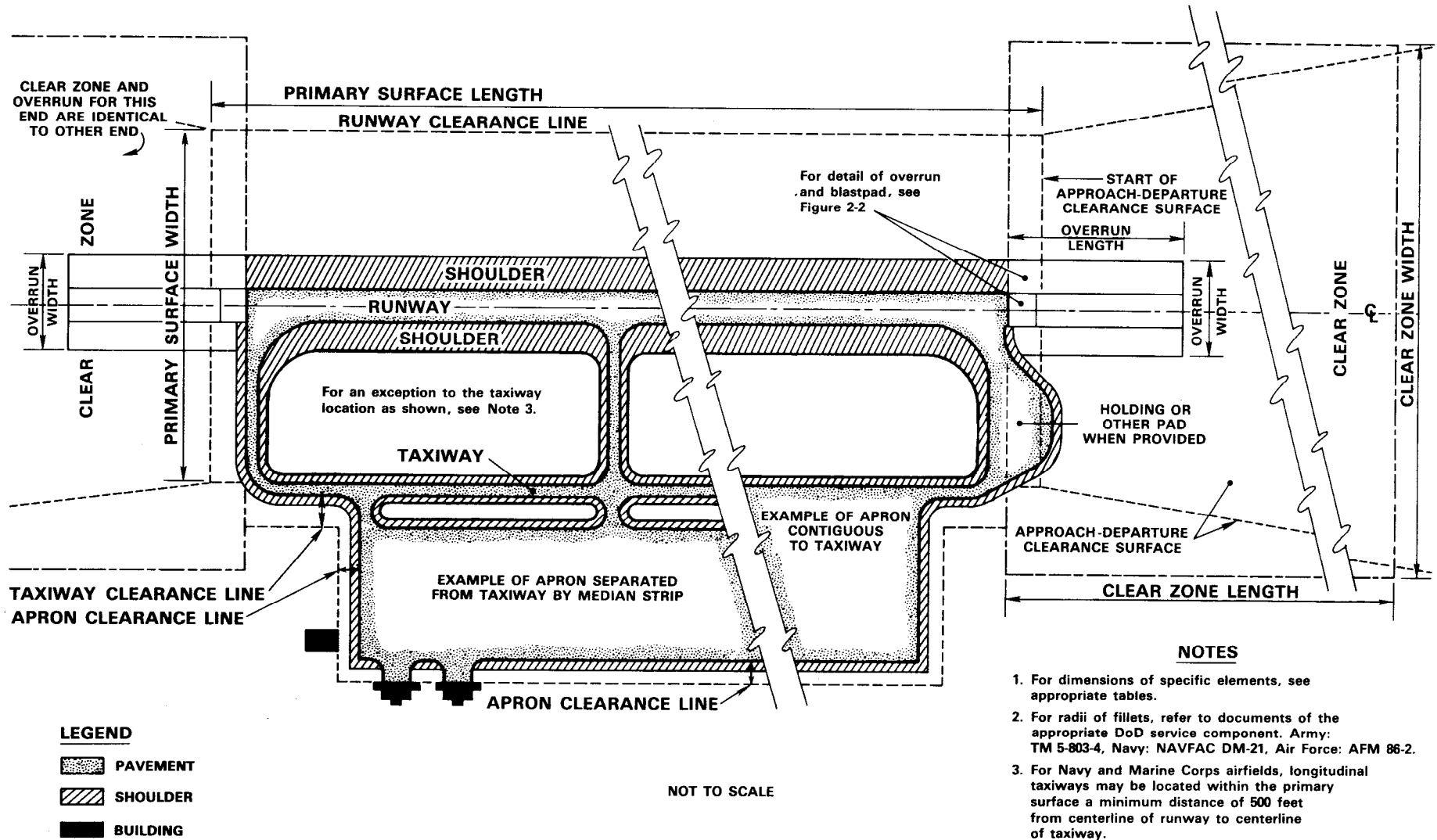
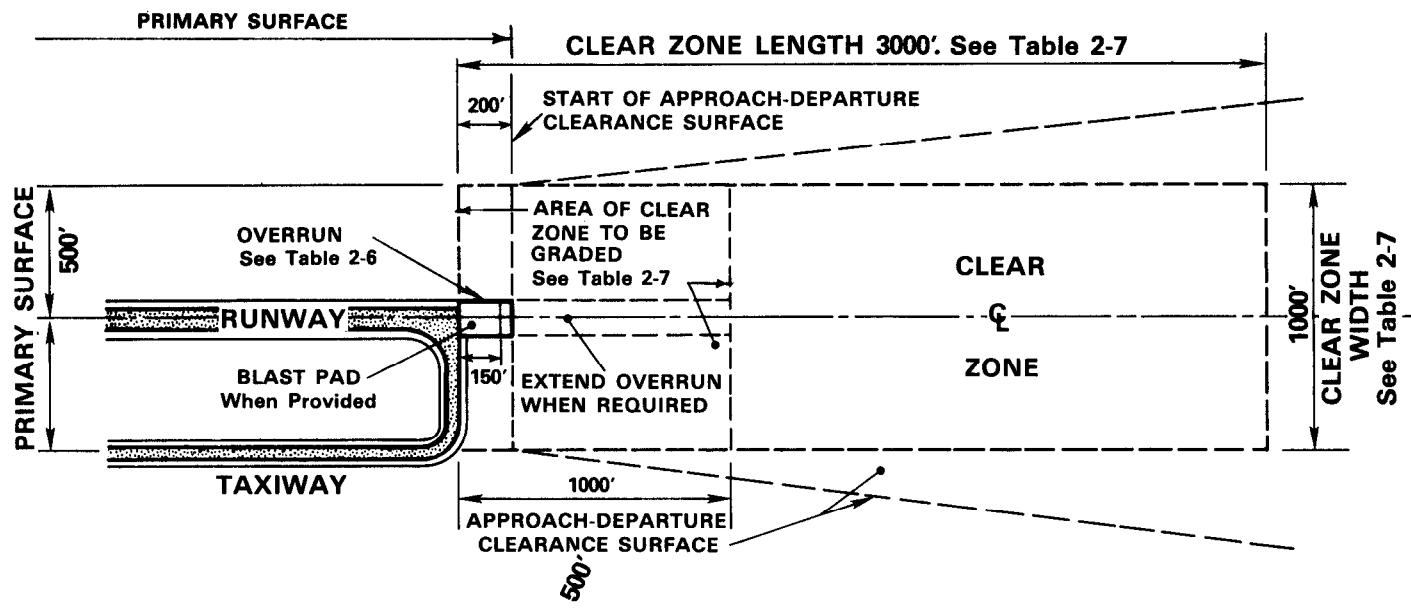


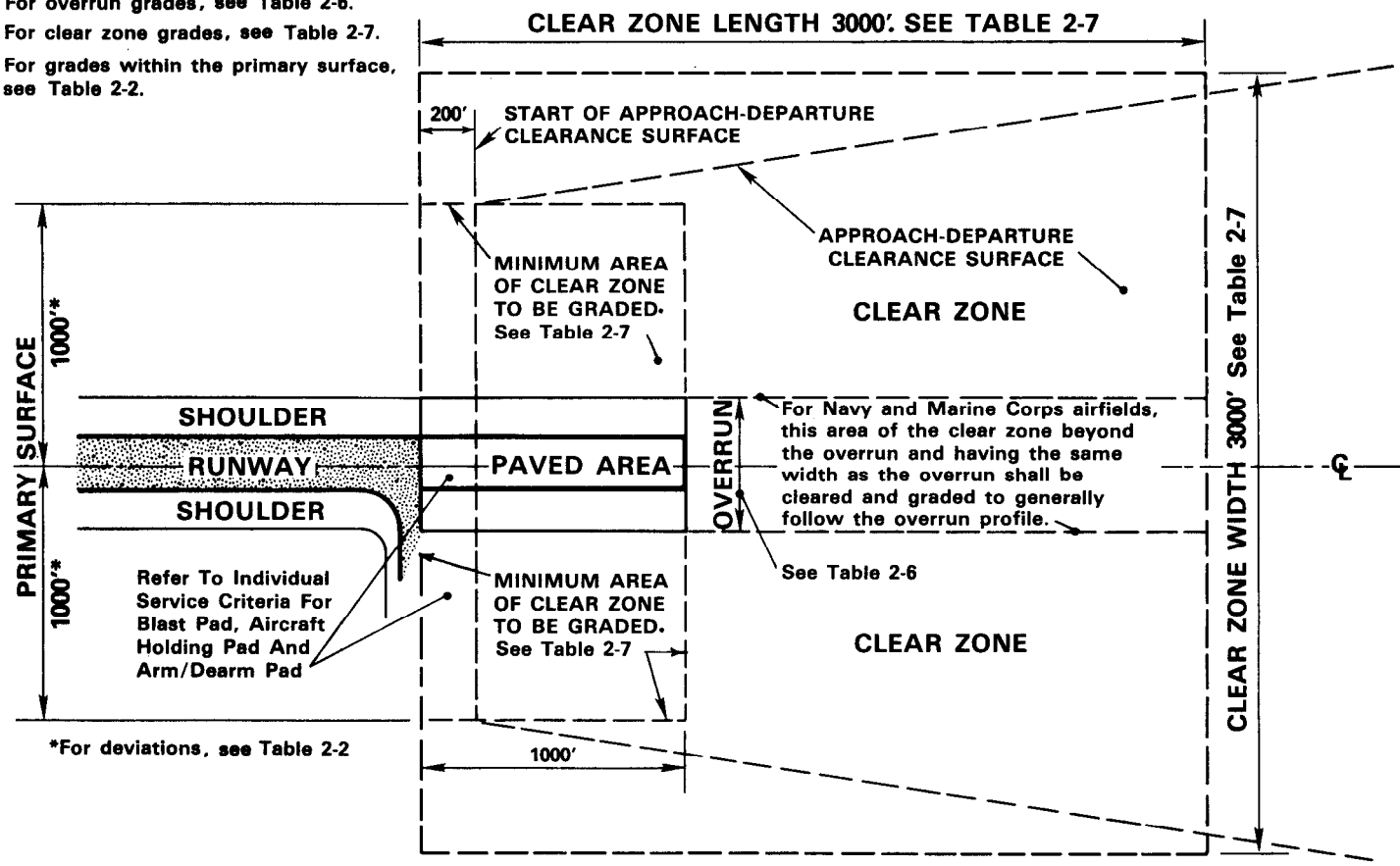
Figure 2-1. Typical Airfield Layout.



CLASS A RUNWAY

NOTES

- 1. For overrun grades, see Table 2-6.
- 2. For clear zone grades, see Table 2-7.
- 3. For grades within the primary surface, see Table 2-2.



CLASS B RUNWAY

Figure 2-2. Runway End and Clear Zone Detail.

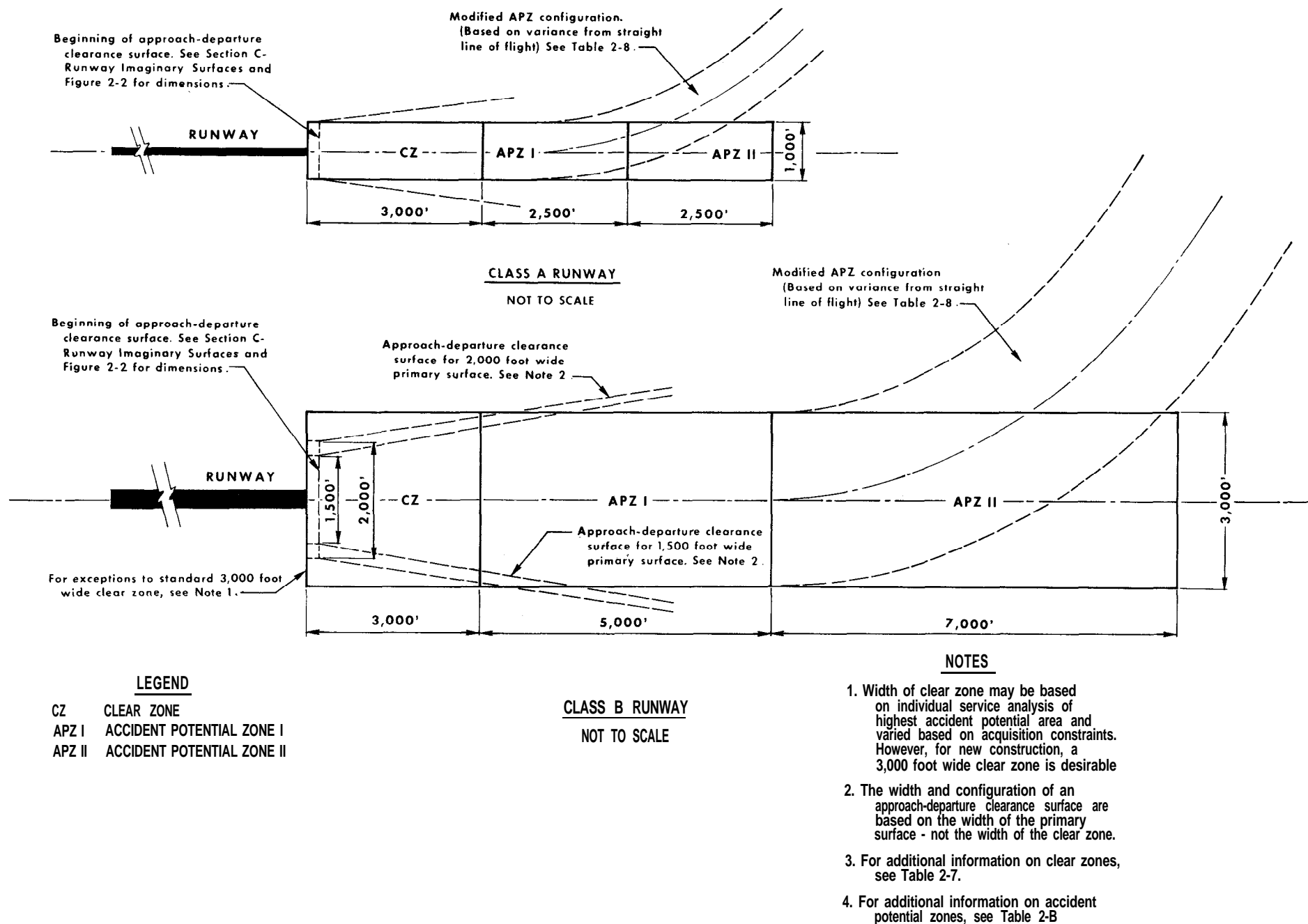
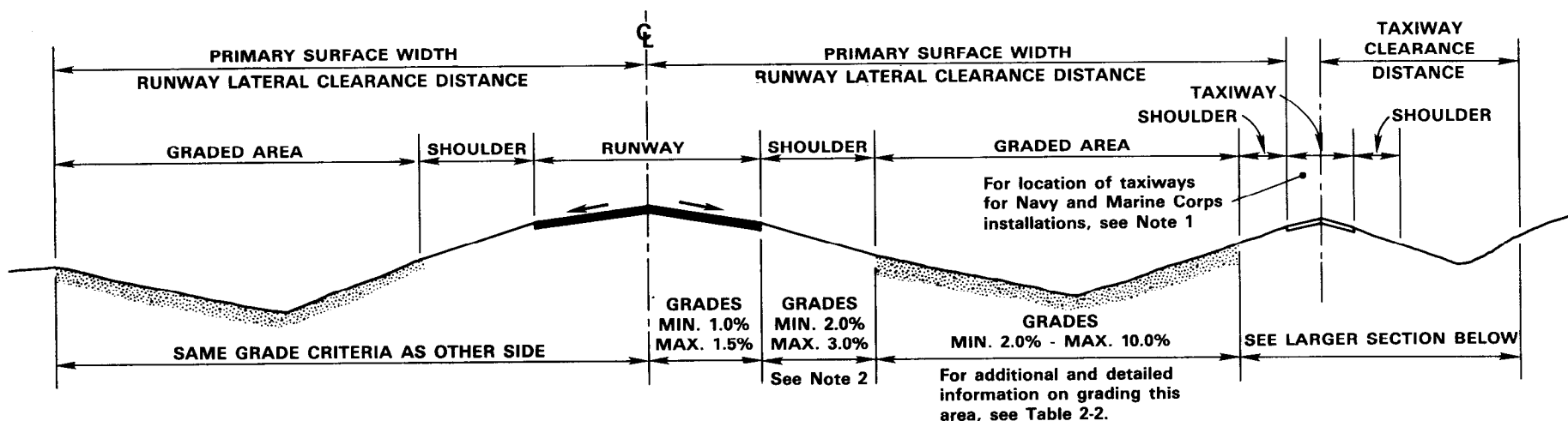
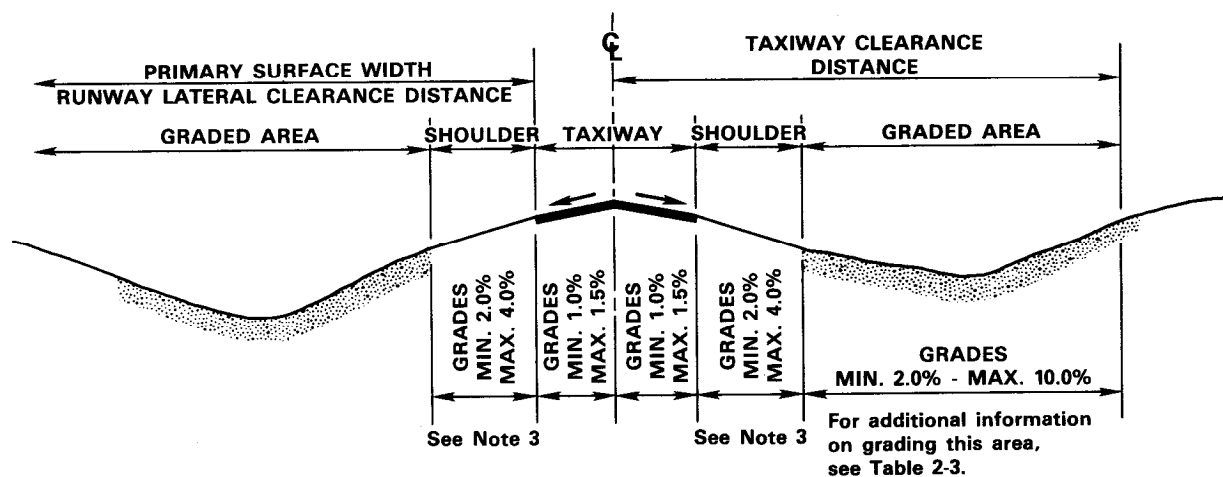


Figure 2-3. Accident Potential Zone Guidelines.



RUNWAY TRANSVERSE SECTION

NOT TO SCALE



TAXIWAY TRANSVERSE SECTION

NOT TO SCALE

CLASS A AND CLASS B RUNWAYS

NOTES

1. At Navy and Marine Corps airfields, taxiways may be located within the primary surface. See Table 2-2.
2. For Class A runways, the runway shoulder grade is 5.0% for the first 10 feet followed by the specified grades. For Class B runways, unpaved shoulder grades may be increased to 5.0% for the first 10 feet followed by the specified grades.
3. For Class A runway taxiways, the shoulder grade is 5.0% for the first 10 feet, followed by the specified grades. For Class B runway taxiways, unpaved shoulders may be increased to 5.0% for the first 10 feet, followed by the specified grades.
4. For taxiways that accommodate B-52 aircraft, slope paved shoulders between 1.5 and 2.0 percent.

Figure 2-4. Runway, Taxiway, and Primary Surface Transverse Sections.

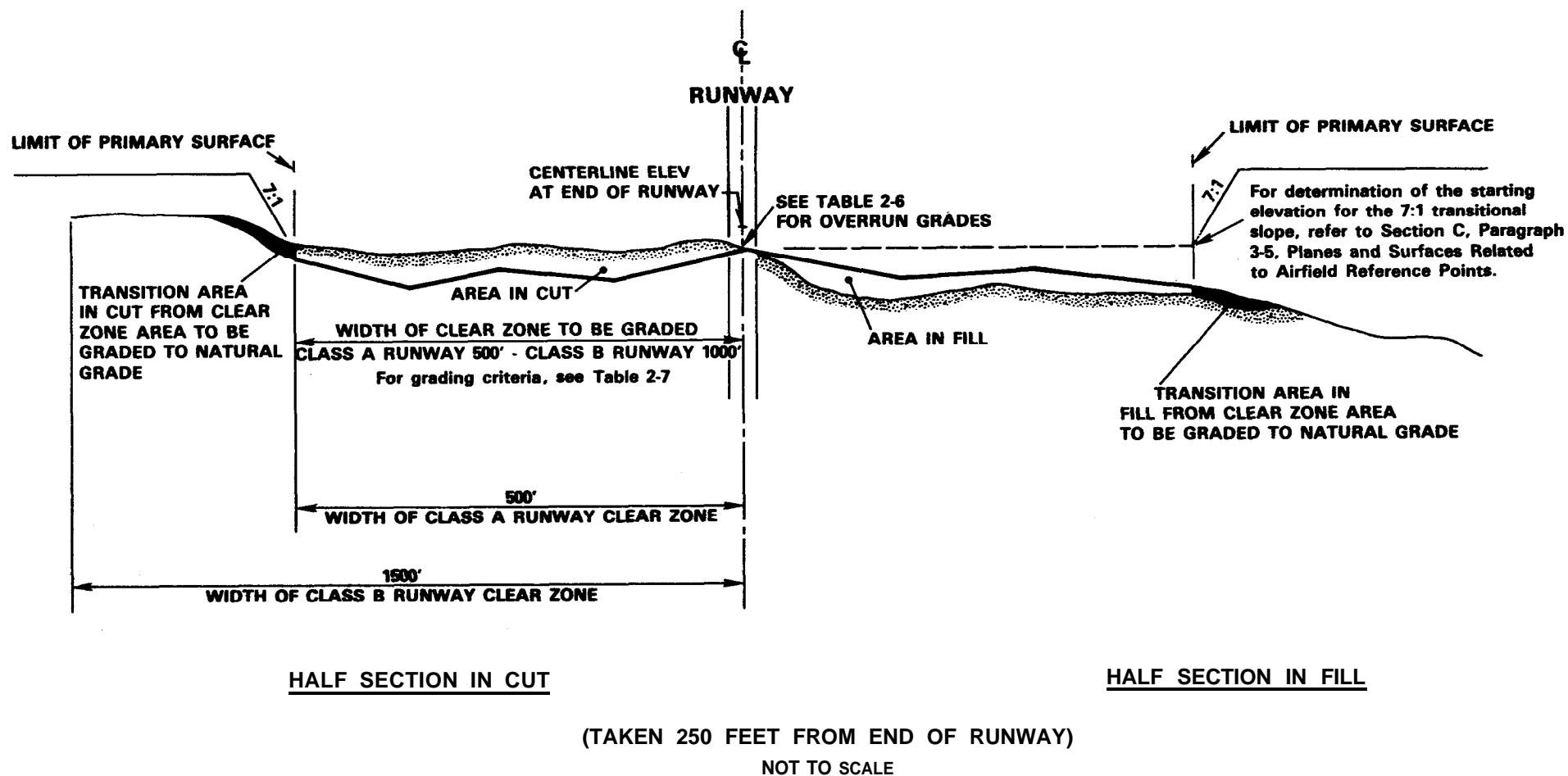
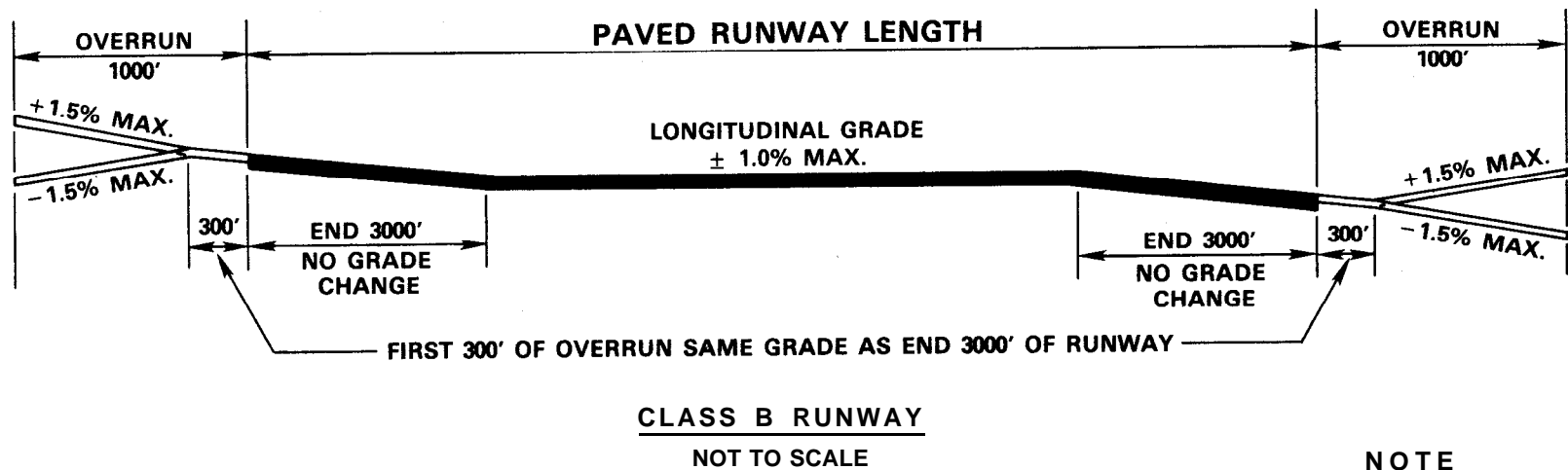
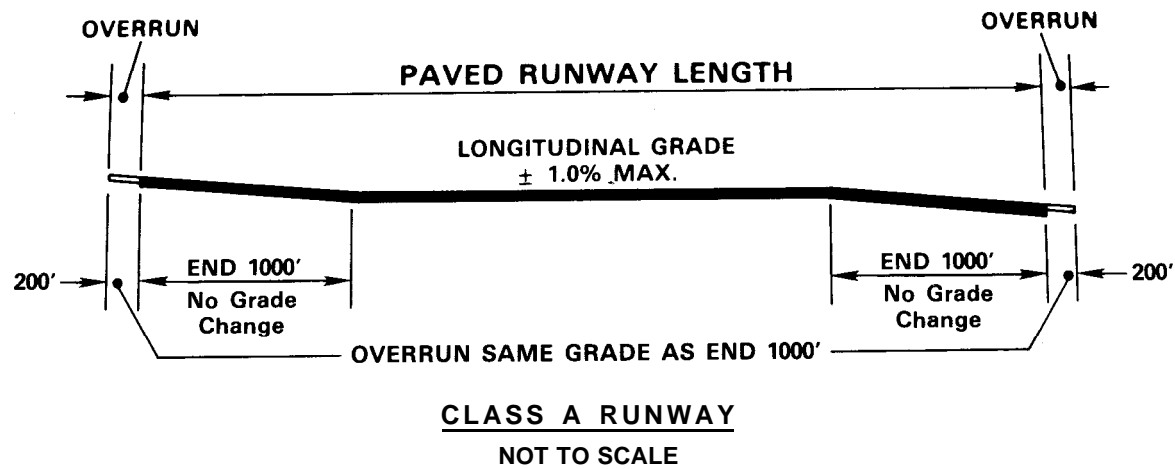


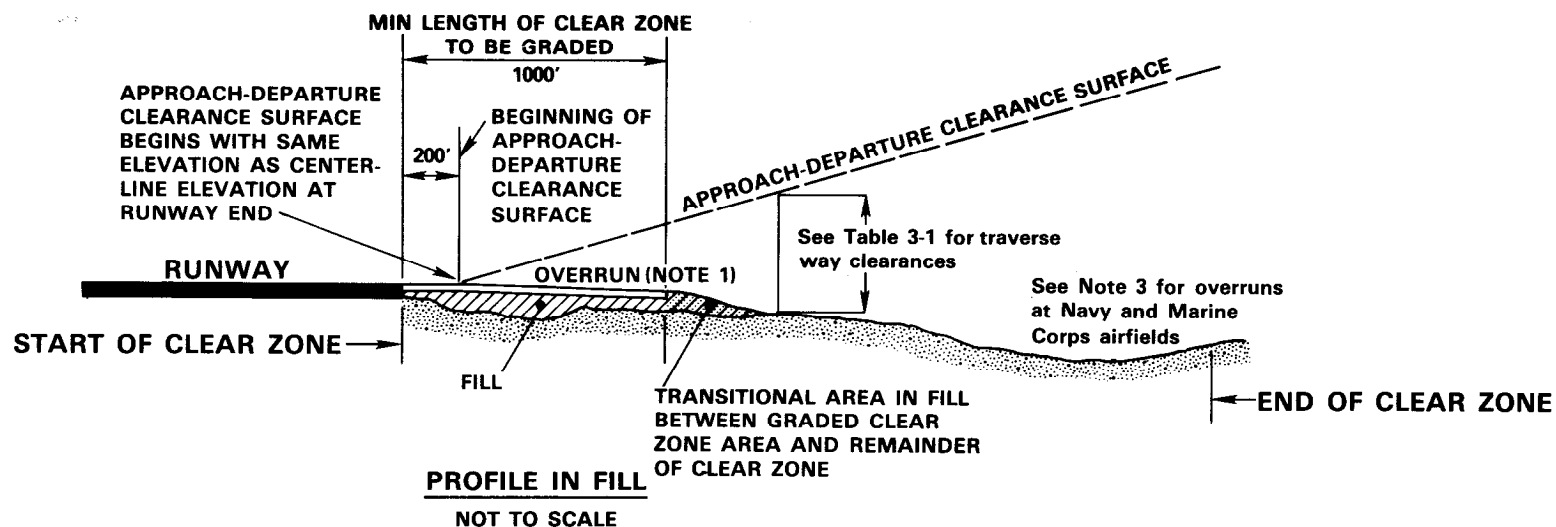
Figure 2-5. Clear Zone Transverse Section Detail.

**NOTE**

To avoid abrupt changes in grade between the first 300 feet of the overrun and the remainder of the overrun, the maximum change of grade is 2.0% per 100 linear feet.

Figure 2-6. Runway and Overrun Longitudinal Profile.

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**NOTES**

1. Length of Overrun:
CLASS A RUNWAY 200'
CLASS B RUNWAY 1000'
2. For a transverse section of the clear zone and area to be graded, see Table 2-3.
3. For additional grading requirements at Navy and Marine Corps airfields, see Figure 2-2 and Table 2-7

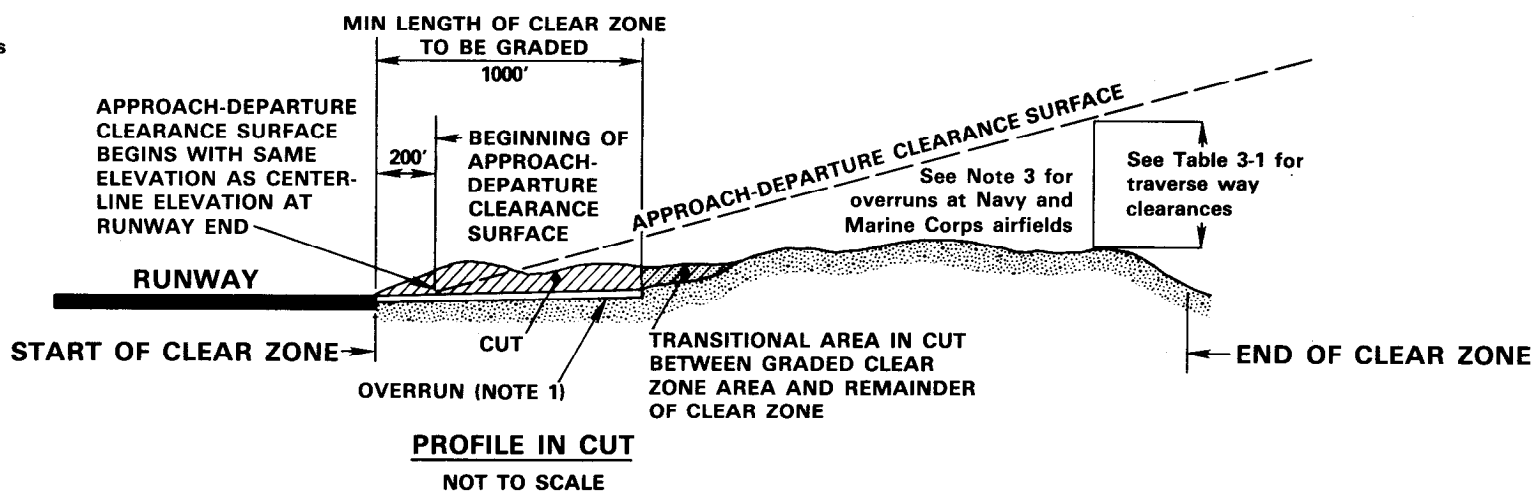
**CLASS A AND CLASS B RUNWAYS**

Figure 2-7. Clear Zone Longitudinal Profile Detail.

Chapter 3

AIRFIELD AIRSPACE CRITERIA

SECTION A-OBSTRUCTIONS TO AIRSPACE

3-1. General Information. This chapter sets standards for determining whether an object or structure is an obstruction to air navigation. It applies to existing and proposed man-made objects, objects of natural growth, and terrain.

SECTION B-STANDARDS FOR DETERMINING OBSTRUCTIONS

3-2. Obstructions to Air Navigation. An existing object (including a mobile object) is, and a future object would be, an obstruction to air navigation if it is higher than any of the following heights or surfaces:

- a. A height of 500 feet above ground level at the site of the object.
- b. A height that is 200 feet above ground level or above the established airfield elevation, whichever is higher, within 3 nautical miles of the established reference point of an airfield. This height increases in the proportion of 100 feet for each additional nautical mile of distance from the airfield up to a maximum of 500 feet.
- c. A height that results in raising an established or proposed minimum descent altitude (MDA) within the initial approach segment or the intermediate approach segment; that which raises the decision height (DH) for precision approach radar (PAR) or instrument landing system (ILS) glide slopes within the final approach segment; that which affects a departure or missed approach climb gradient within the departure area or missed approach segment; or that which affects the MDA within the circling approach area.
- d. A height within an en route obstacle clearance area, including turn and termination areas, of a federal airway or approved off-airway route that would increase the minimum obstacle clearance altitude.
- e. The surface of a takeoff and landing area of an airfield or any imaginary surface established under para-

graphs 3-4 and 3-5. However, no part of the takeoff or landing area itself is considered an obstruction.

3-3. Traverse Ways. The minimum vertical clearance given in table 3-1 must be maintained between the traverse way and imaginary surfaces given in paragraph 3-4 except when:

- a. The traverse way is controlled. Control in this sense is exercised by an air traffic control (ATC) facility or through an agreement between the responsible ATC facility and another agency with the capability to exercise control.
- b. An existing traverse way is physically limited to lesser heights. For example, an overpass over a public highway or a roadway has a clearance of 13 feet, but warning signs are posted before the point where the highway enters the obstacle clearance area.

SECTION C-RUNWAY IMAGINARY SURFACES

3-4. Planes and Surfaces Related to Runways:

a. **Primary Surface.** A surface on the ground or water centered lengthwise on the runway and extending 200 feet beyond each end of that runway. The width of the primary surface is:

- (1) One thousand feet for a Class A runway.
- (2) Two thousand feet for a Class B runway.

NOTE: Exceptions to the above widths are the same as specified in table 2-2, item 8.

b. **Clear Zone Surface.** A surface on the ground or water beginning at the runway end and symmetrical about the runway centerline extended. Dimensions for the length and width are the same as for clear zones specified in table 2-7.

c. **Approach-Departure Clearance Surface.** An inclined plane or combination inclined and horizontal plane, symmetrical about the runway centerline extended. The inclined plane flares outward and upward

Table 3-1. Highway, Railroad and Waterway Clearances.

Item No.	Item Description	Traverse Way	Class A and Class B
			Runways Dimension
1	Minimum vertical clearance between established imaginary surfaces and traverse ways (measured from the highest and nearest elevation of the traverse way).	Interstate highway that is part of the National System of Military and Interstate Highways.	17 ft
2		Other public highways not covered in item 1.	15 ft
3		Private or military road.	10 ft minimum, or height of highest mobile object that would usually traverse them, whichever is greater.
4		Railroad.	23 ft
5		Waterway or traverse way not previously covered.	A distance equal to the height of the highest mobile object that usually would traverse them.

from the primary surface, having the same width as the primary surface, and begins with the centerline elevation of the runway end. The slope ratio and dimensions of the inclined plane and dimensions of the horizontal plane vary with the type of runway prescribed. For:

(1) A VFR Class A runway, the slope ratio of the inclined plane is 40 to 1. It extends a horizontal distance of 10,000 feet with an outer width of 2,500 feet.

(2) An IFR Class A runway, the slope ratio of the inclined plane is 40 to 1 until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the point of beginning. The outer width is 16,000 feet.

(3) A Class B runway (VFR and IFR), the slope ratio of the inclined plane is 50 to 1 until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the point of beginning. The outer width is 16,000 feet.

3-5. Planes and Surfaces Related to Airfield Reference Points:

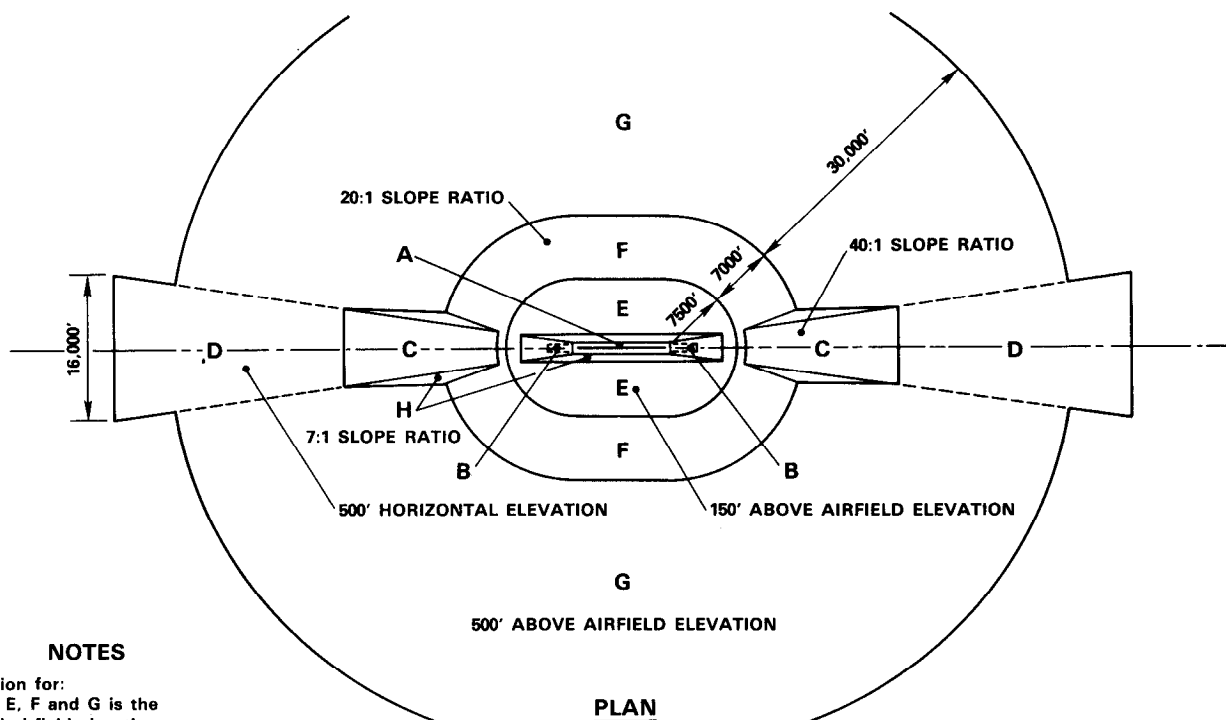
a. **Inner Horizontal Surface.** An oval-shaped plane at a height of 150 feet above the established airfield elevation. It is constructed by scribing an arc with a radius of 7,500 feet about the centerline at each end of each runway and interconnecting these arcs with tangents.

b. **Conical Surface.** An inclined plane that extends from the periphery of the inner horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation.

c. **Outer Horizontal Surface.** A plane located 500 feet above the established airfield elevation, extending outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet.

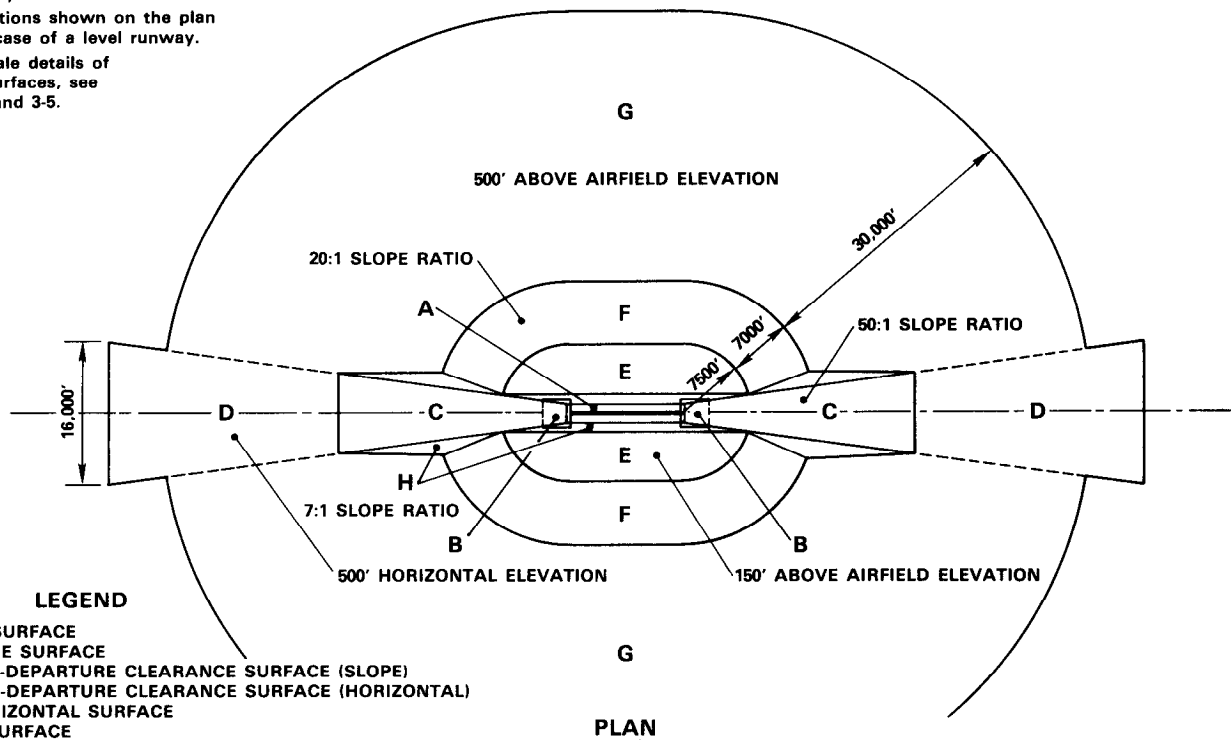
d. **Transitional Surface.** Inclined planes that connect the primary surface and the approach-departure clearance surfaces to the inner horizontal surface, conical surface, outer horizontal, or other transitional surfaces. The slope is 7 to 1 outward and upward at right angles to the runway centerline and runway centerline extended. To determine the elevation for the beginning of the transitional surface slope at any point along the lateral boundary of the primary surface, draw a line from the point, perpendicular to the runway centerline or to the runway centerline extended. *The elevation of the runway or of the runway centerline extended at that intersection is the elevation for the beginning of the 7 to 1 slope.*

3-6. Criteria for Imaginary Surfaces. The imaginary surfaces defined above are illustrated in figures 3-1 through 3-5.



CLASS A IFR RUNWAY

- NOTES**
1. Datum elevation for:
 - a. surface D, E, F and G is the established airfield elevation.
 - b. surface C is the runway centerline elevation at the threshold.
 - c. surface H varies at each point along the runway centerline.
 2. The intersections shown on the plan are for the case of a level runway.
 3. For large scale details of imaginary surfaces, see Figures 3-4 and 3-5.



CLASS B RUNWAY

- LEGEND**
- A PRIMARY SURFACE
 - B CLEAR ZONE SURFACE
 - C APPROACH-DEPARTURE CLEARANCE SURFACE (SLOPE)
 - D APPROACH-DEPARTURE CLEARANCE SURFACE (HORIZONTAL)
 - E INNER HORIZONTAL SURFACE
 - F CONICAL SURFACE
 - G OUTER HORIZONTAL SURFACE
 - H TRANSITIONAL SURFACE

Figure 3-1. Imaginary Surfaces.

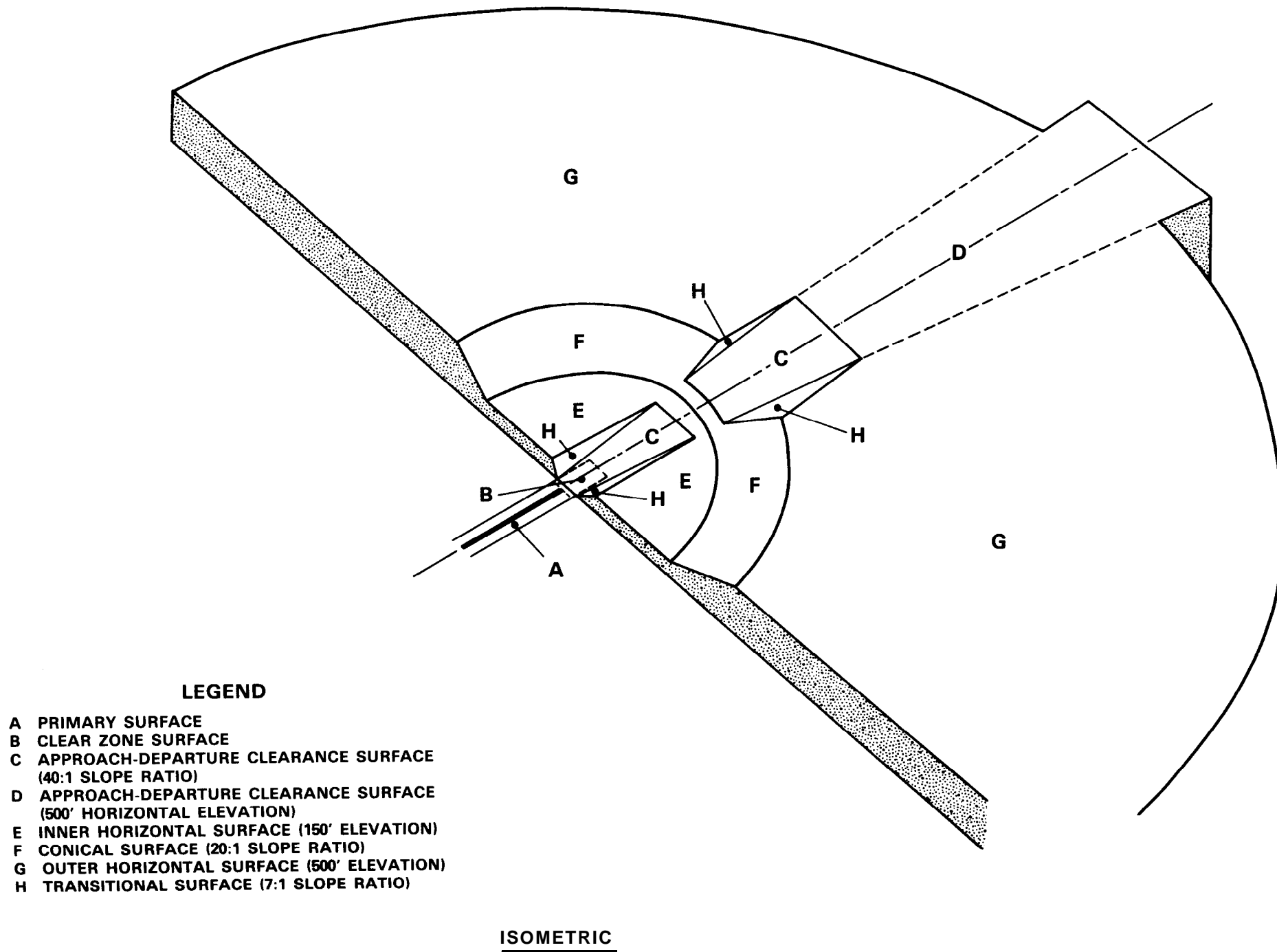


Figure 3-2. Class A IFR Runway Airspace Imaginary Surfaces.

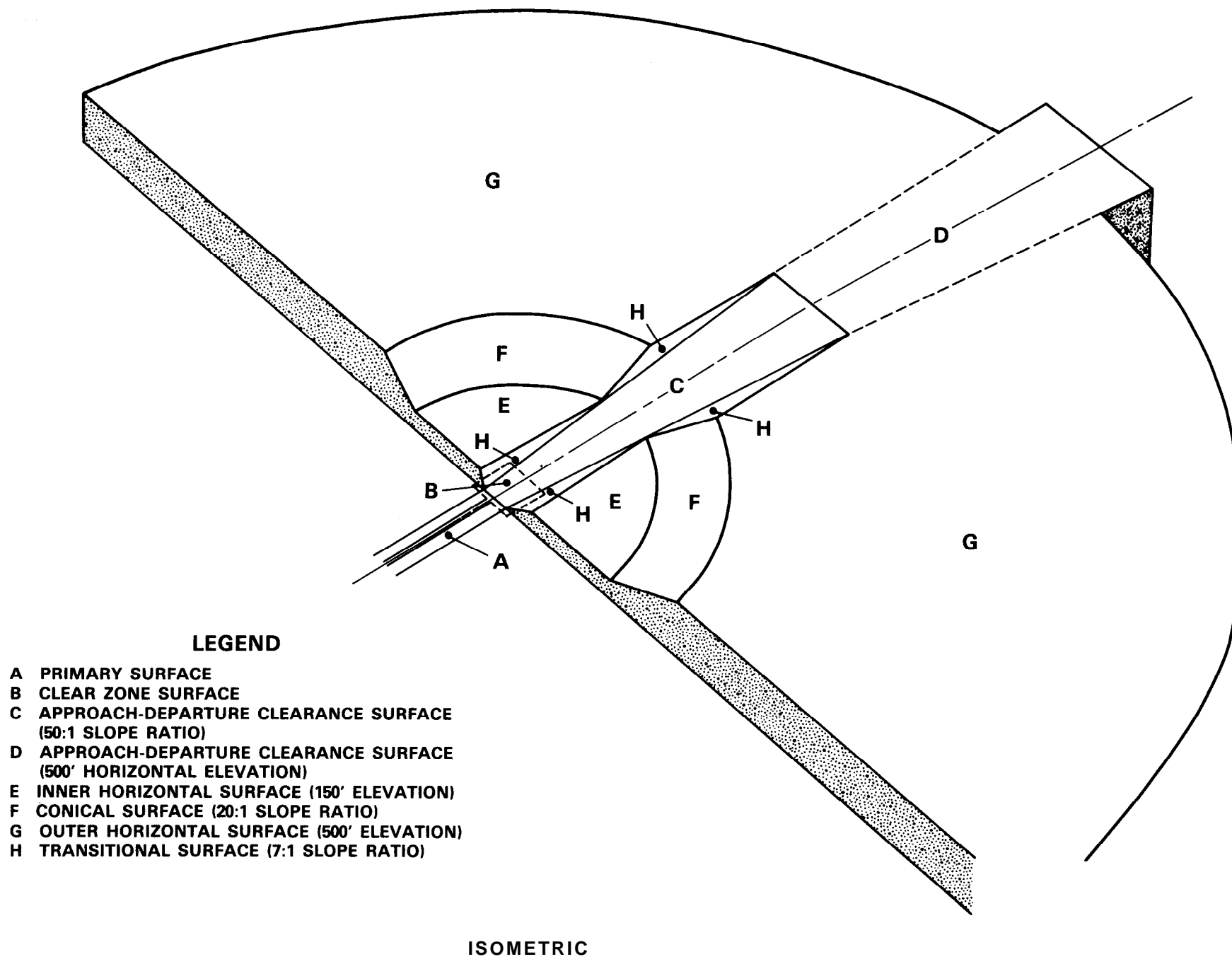


Figure 3-3. Class B Runway Airspace Imaginary Surfaces.

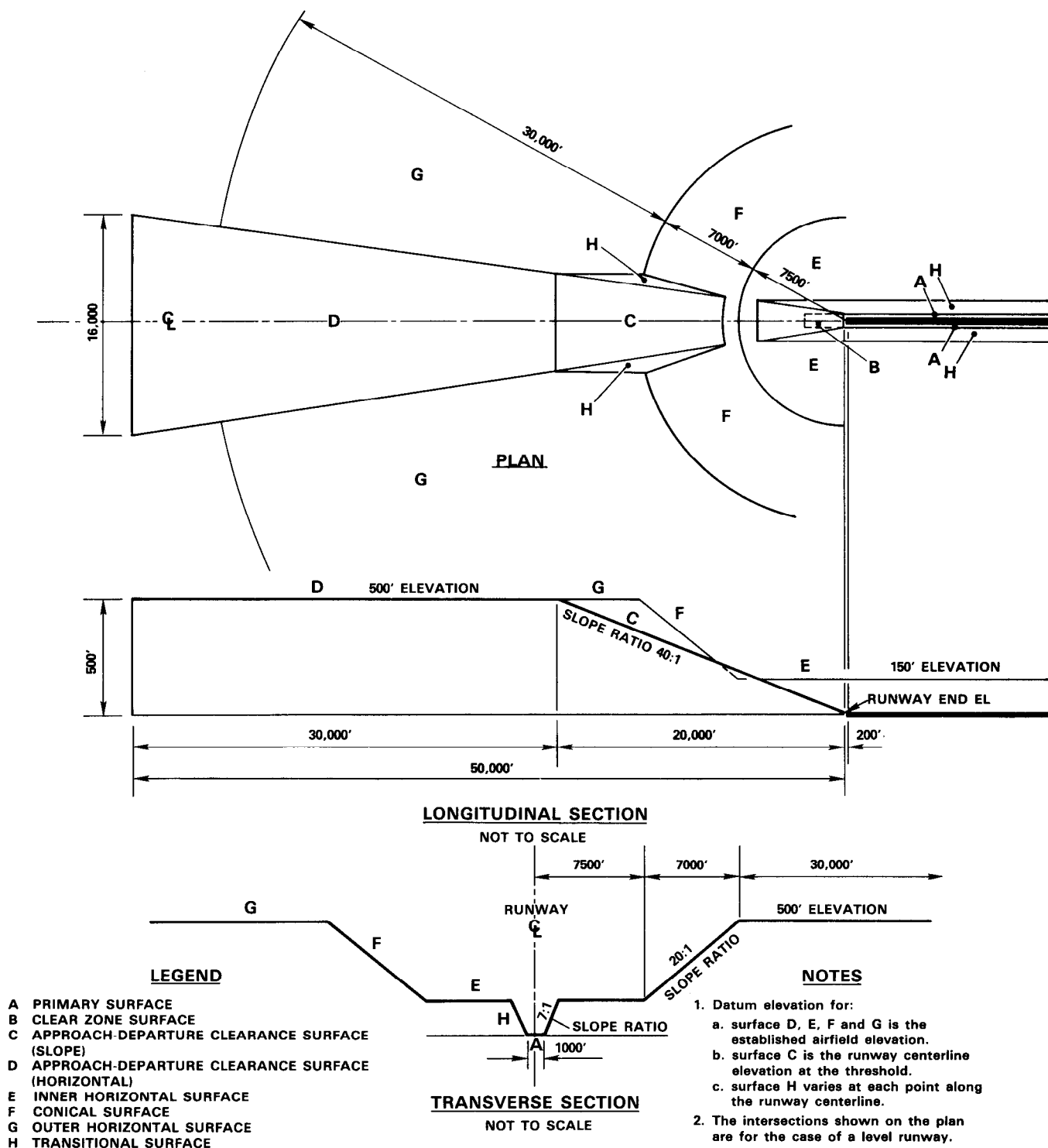
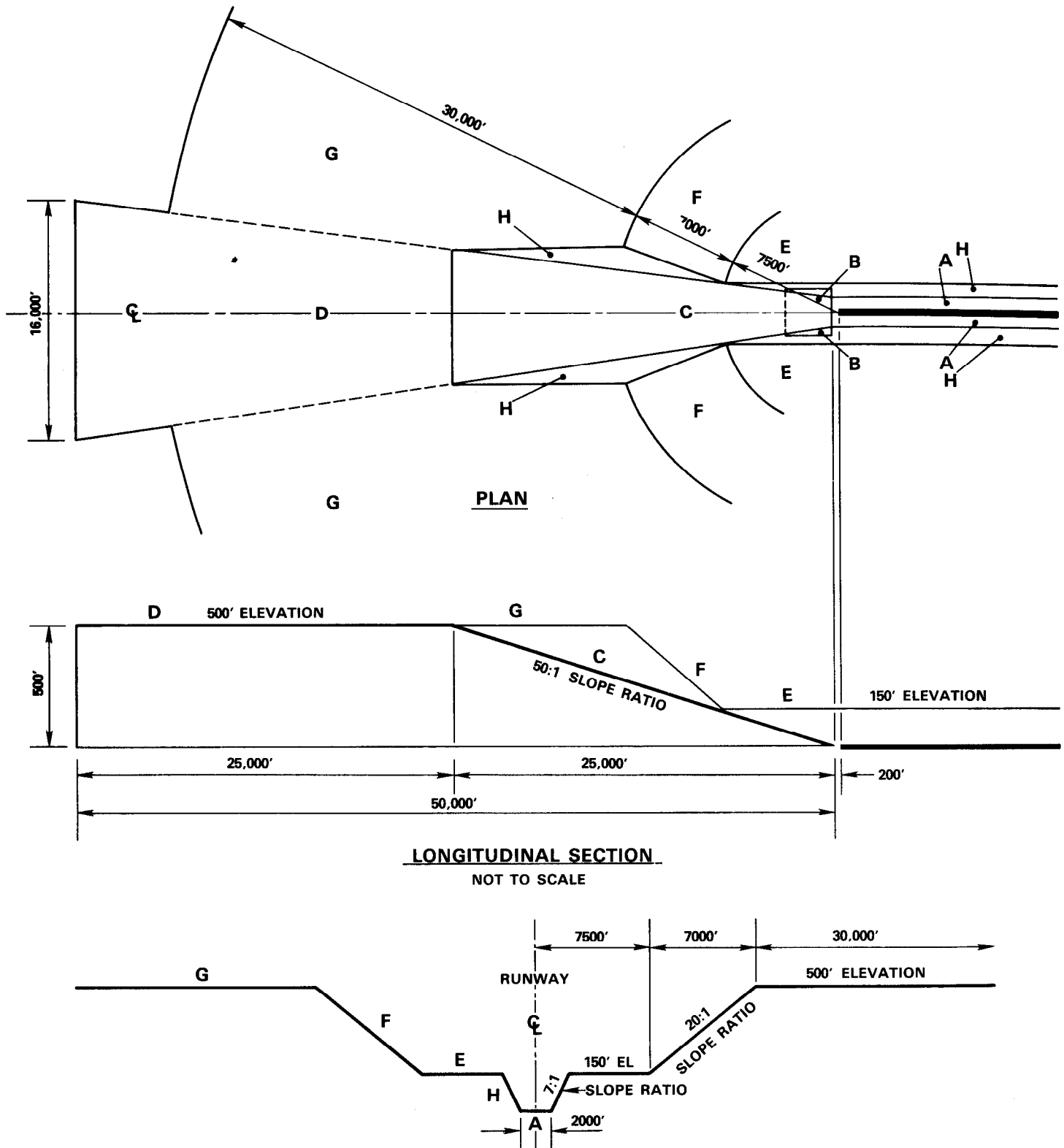


Figure 3-4. Class A IFR Runway Airspace Imaginary Surfaces.

**LEGEND**

- A PRIMARY SURFACE
- B CLEAR ZONE SURFACE
- C APPROACH-DEPARTURE CLEARANCE SURFACE (SLOPE)
- D APPROACH-DEPARTURE CLEARANCE SURFACE (HORIZONTAL)
- E INNER HORIZONTAL SURFACE
- F CONICAL SURFACE
- G OUTER HORIZONTAL SURFACE
- H TRANSITIONAL SURFACE

TRANSVERSE SECTION

NOT TO SCALE

NOTES

1. Datum elevation for:
 - a. surface D, E, F and G is the established airfield elevation.
 - b. surface C is the runway centerline elevation at the threshold.
 - c. surface H varies at each point along the runway centerline.
2. The intersections shown on the plan are for the case of a level runway.

Figure 3-5. Class B Runway Imaginary Surfaces.

PART THREE

ROTARY-WING AIRCRAFT

Chapter 4

HELICOPTER LANDING FACILITIES

SECTION A-HELICOPTER RUNWAYS

4-1. Layout Criteria. Tables 4-1 through 4-6 set the principal dimensional criteria, clearances, and grades for

helicopter runways and supporting helicopter operational facilities usually located at heliports. These standards are illustrated in figures 4-1 and 4-2.

Table 4-1. Helicopter Runways.

Item No.	Item Description	Requirement	Remarks
1	Basic Length	450 ft	Basic length to be corrected for elevation and temperature. Increase 10.0 percent for each 1,000 feet in elevation above 2,000 feet M.S.L. and add 4.0 percent for each 10°F, [above 59°F] for the average daily maximum temperature for the hottest month. For a special mission or proficiency training such as autorotation operations, the length may be increased up to 1,000 feet, in which case make no additive corrections.
2	Width	75 ft	A minimum of 100 feet on airfields which regularly accommodate H-53 aircraft.
3	Longitudinal grade	Max 1.0%	
4	Transverse grade	Min 1.0% Max 1.5%	From centerline of runway.
5	Shoulders		See table 4-4.
6	Runway lateral clearance distance (corresponds to width of primary surface area)	VFR: 150 ft IFR: 375 ft	Measured from centerline of runway to fixed and mobile obstacles. (1) Fixed obstacles include manmade or natural features constituting possible hazards to moving aircraft. Navigational aids and meteorological equipment are possible exceptions. Criteria for siting these facilities are in documents of the appropriate DOD Service component. Army: TM 5-803-4, Navy: NAVFAC P-80, and Air Force: AFM 86-8. (2) Mobile obstacles include parked aircraft, parked and moving vehicles, railroad cars and similar equipment. (3) Taxiing aircraft are exempt from this restriction.
7	Grades within the primary surface area in any direction	Max 5.0%	Exclusive of pavement and shoulders. For Air Force installations, a minimum of 2.0 percent before channelization.

Table 4-2. Helicopter Taxiways.

Item No.	Item Description	Requirement	Remarks
1	Width	40 ft	Basic width applicable to taxiways that support helicopter operations only. When dual use taxiways support fixed-wing aircraft operations, use the appropriate fixed-wing criteria.

Table 4-2. Helicopter Taxiways Continued.

Item No.	Item Description	Requirement	Remarks
2	Longitudinal grade	Max 2.0%	
3	Transverse grade	Min 1.0% Max 1.5%	
4	Shoulders		See table 4-4.
5	Clearance from centerline to fixed and mobile obstacles (taxiway clearance line)	Min 100 ft	Basic helicopter clearance. Increase as appropriate for dual use taxiways. See table 4-1, item 6 for definitions of fixed and mobile obstacles.
6	Grades within the clear area	Max 5.0%	Clear area is the area between the taxiway shoulder and the taxiway clearance line.

Table 4-3. Helicopter Aprons.

Item No.	Item Description	Requirement	Remarks
1	Size and Configuration	Variable	Aprons are determined by the types and quantities of helicopters to be accommodated. Other determinates are the physical characteristics of the site and the objective of the master plan.
2	Grades in the direction of drainage	Min 0.5% Max 1.5%	Engineering analysis occasionally may indicate a need to vary these limits. However, arbitrary deviation is not intended. Avoid surface drainage with numerous or abrupt grade changes that can cause adverse flexing in the rotor blades.
3	Clear taxilane (interior)	2.5 x rotor dia	Use rotor diameter of largest helicopter generally using the apron. When a taxilane on an apron area has a dual use with fixed-wing aircraft, adjust the width accordingly.
4	Clear taxilane width (perimeter)	1.5 x rotor dia to centerline of taxiway, plus an additional 20 ft from centerline of taxiway to apron edge	
5	Hoverlane	2.5 x rotor dia	Diameter of largest helicopter generally using the apron.
6	Shoulders		See table 4-4.
7	Clearance to fixed and mobile obstacles	75 ft 100 ft	Measured from rear and side of apron. Distance to other aircraft operational pavements may require a greater clearance. For aprons regularly servicing H-53 helicopters.

Table 4-4. Helicopter Shoulders.

Item No.	Item Description	Requirement	Remarks
1	Shoulders adjacent to all operational pavements	25 ft	May be increased when necessary to accommodate dual operations with fixed-wing aircraft.
2	Longitudinal grade	Variable	Conform to the longitudinal grade of the abutting primary pavement.
3	Transverse grade	5.0% first 10 ft followed by 2.0% min 4.0% max	Slope from pavement.

Table 4-6. Helicopter Overruns.

Item No.	Item Description	Requirement	Remarks
1	Length	75 ft	
2	Width	125 ft	Width of runway plus shoulders.
3	Longitudinal centerline grade	Same as last 100 ft of runway	
4	Transverse grade	Min 2.0% Max 3.0%	Warp to meet runway and shoulder grades.

Table 4-6. Helicopter Runway Takeoff Safety Zone.*

Item No.	Item Description	Requirement	Remarks
1	Length	400 ft	
2	Width (inner edge)	300 ft	Corresponds to the width of the primary surface. VFR
3	Width (outer edge)	400 ft	
4	Grades in any direction	Max 5.0%	Area to be free of obstructions. Rough grade and turf when required.

*The takeoff safety zone area for helicopter runways corresponds to the clear zone land use criteria for fixed-wing airfields as defined for DOD AICUZ standards. The remainder of the approach-departure zone corresponds to APZ I land use criteria similarly defined. It does not apply to IFR helicopter facilities due to the extensive IFR primary surface area.

SECTION B-HELIPADS

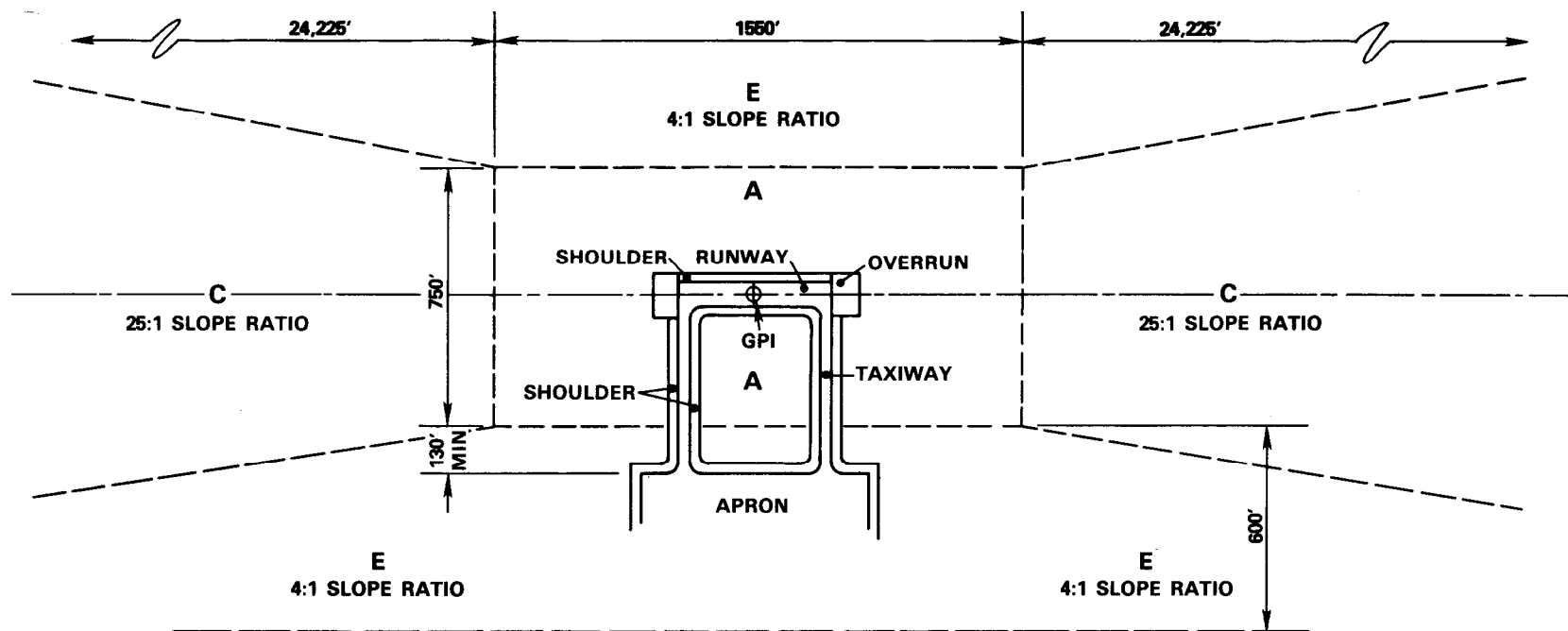
4-2. General Information. Criteria for three types of helipads are provided. The type to be developed depends on the operational requirements. These types are described in paragraphs 4-3 through 4-7.

4-3. Standard VFR Helipad. VFR standards are used when no requirement exists or will exist in the future for an IFR facility. Criteria for this type of helipad permits the accommodation of all helipad lighting systems.

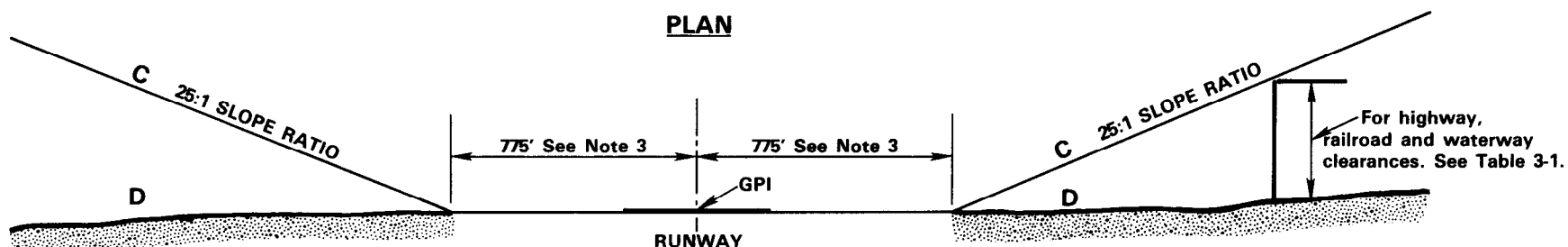
4-4. Limited Use Helipad. This is a VFR facility used at sites where only occasional operations are conducted. These sites may be, but are not limited to, hospitals,

headquarters areas, missile sites, and at established airfields or heliports where it may be used to provide separate landing facilities in order to preclude mixing helicopter and fixed-wing traffic. It may also be used to separate small helicopter traffic (OH, UH, and AH helicopters) from medium and heavy helicopter traffic. The size of this helipad and its primary surface permits inset and perimeter lighting only.

4-5. IFR Helipad. IFR standards are used when an instrument capability is essential to the mission and no other instrumented landing facilities, either fixed-wing or rotary-wing, are located within acceptable commuting distance of the site.



PLAN



LONGITUDINAL PROFILE

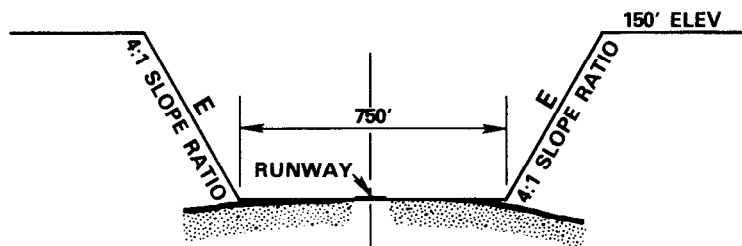
NOT TO SCALE

LEGEND

- A PRIMARY SURFACE
- B TAKEOFF SAFETY ZONE (Not shown - See Note 1)
- C APPROACH-DEPARTURE CLEARANCE SURFACE (25:1 SLOPE RATIO)
- D APPROACH-DEPARTURE ZONE
- E TRANSITIONAL SURFACE (4:1 SLOPE RATIO)
- GPI GROUND POINT OF INTERCEPT

NOTES

1. The takeoff safety zone is not applicable to IFR helicopter facilities due to the extensive IFR primary surface area.
2. For an isometric drawing of this facility, see Figure 5-2.
3. The approach-departure clearance surface begins 775' from the GPI. For this drawing, the GPI is located at the center of the runway.



TRANSVERSE SECTION

NOT TO SCALE

Figure 4-2. Helicopter IFR Runway.

4-6. Standby Parking Pad. At individual helipad sites where it is necessary to have one or more helicopters on standby, an area adjacent to the helipad but clear of the landing, approach and transitional surfaces should be designated.

4-7. Layout Criteria. The principal dimensional criteria, clearances, and grades for helipad layouts to support rotary-wing aircraft operations are in table 4-7. These standards are illustrated in figures 4-3 through 4-5.

Table 4-7. Helipads.

Item No.	Item Description	Requirement	Remarks
1	Size	75 ft x 75 ft min to 100 ft x 100 ft max	VFR limited use. For Air Force missile facilities 50 ft x 50 ft min.
		100 ft x 100 ft	VFR standard size and IFR.
2	Grade	Min 1.0% Max 1.5%	Grade in one direction.
3	Shoulders		See table 4-4.
4	Size of primary surface	150 ft min	VFR limited use.
		150 ft min	
		300 ft x 300 ft	VFR standard size.
		1,550 ft x 750 ft	IFR
5	Grades within the primary surface area in any direction	Min of 2.0% prior to channel- ization* Max 5.0%	Exclusive of pavement and shoulders. VFR limited use of VFR standard helipad. For an IFR helipad applicable within the limits of the 300 ft x 300 ft area. The balance of the area is to be clear of obstructions and rough graded to the extent necessary to reduce damage to aircraft in event of an emergency landing.
6	Length of takeoff safety zone **	400 ft	
7	Width of takeoff safety zone* * (inner edge)	150 ft min 300 ft	Corresponds to the width of the primary surface. VFR limited use. VFR standard size.
8	Width of takeoff safety zone* * (outer edge)	400 ft	VFR limited use. Dependent upon flair and length of approach-departure zone. VFR standard size.
9	Grades of takeoff safety zone* * any direction	Max 5.0%	Area to be free of obstructions. Rough grade and turf when required.

*Bed of channel may be flat.

**The takeoff safety zone area for helipads corresponds to the clear zone land use criteria for fixed-wing airfields as defined for DOD AICUZ standards. The remainder of the approach-departure zone corresponds to APZ I land use criteria similarly defined. It does not apply to IFR helicopter facilities due to the extensive IFR primary surface area.

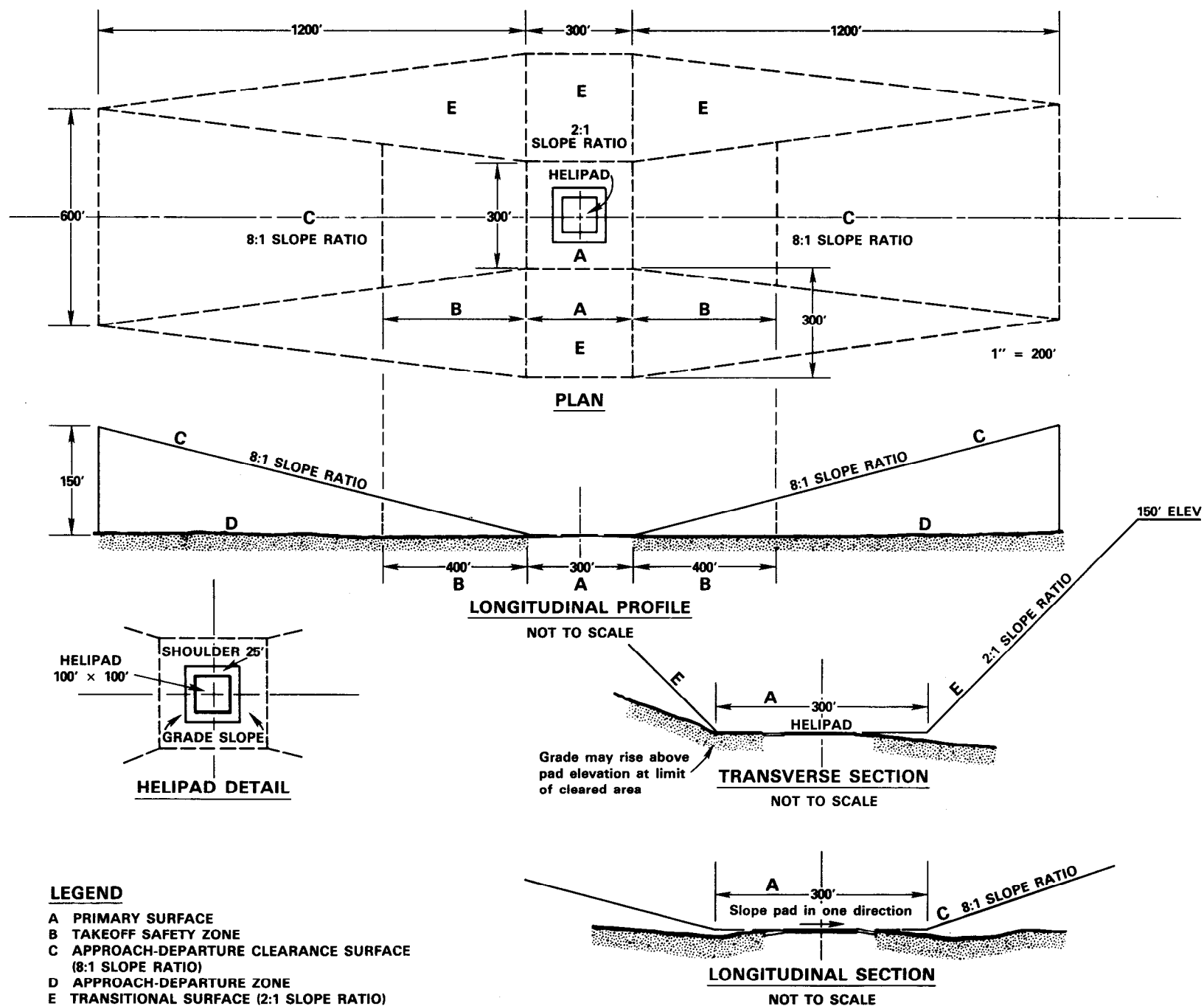


Figure 4-3. Standard VFR Helipad.

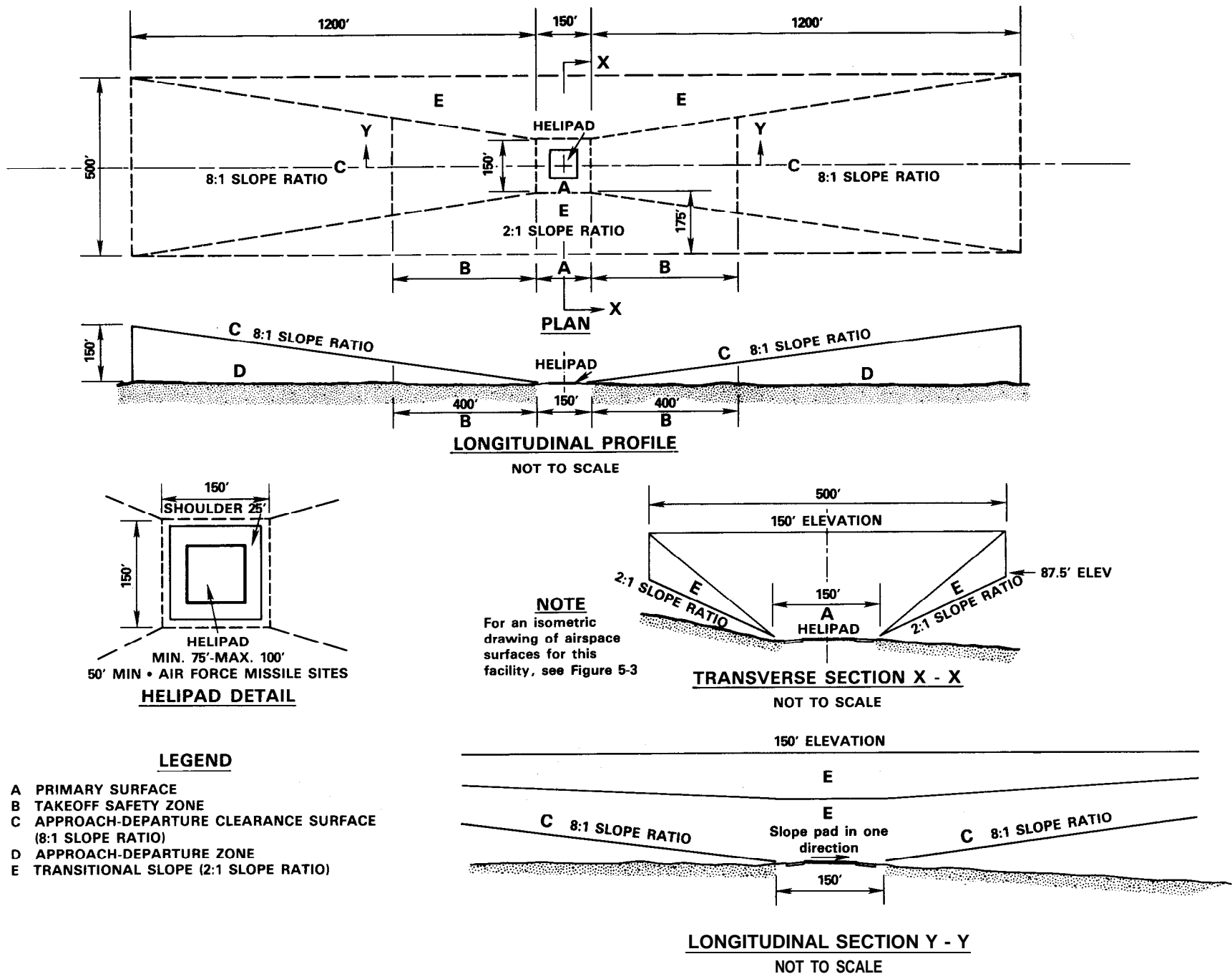


Figure 4-4. Limited Use VFR Helipad.

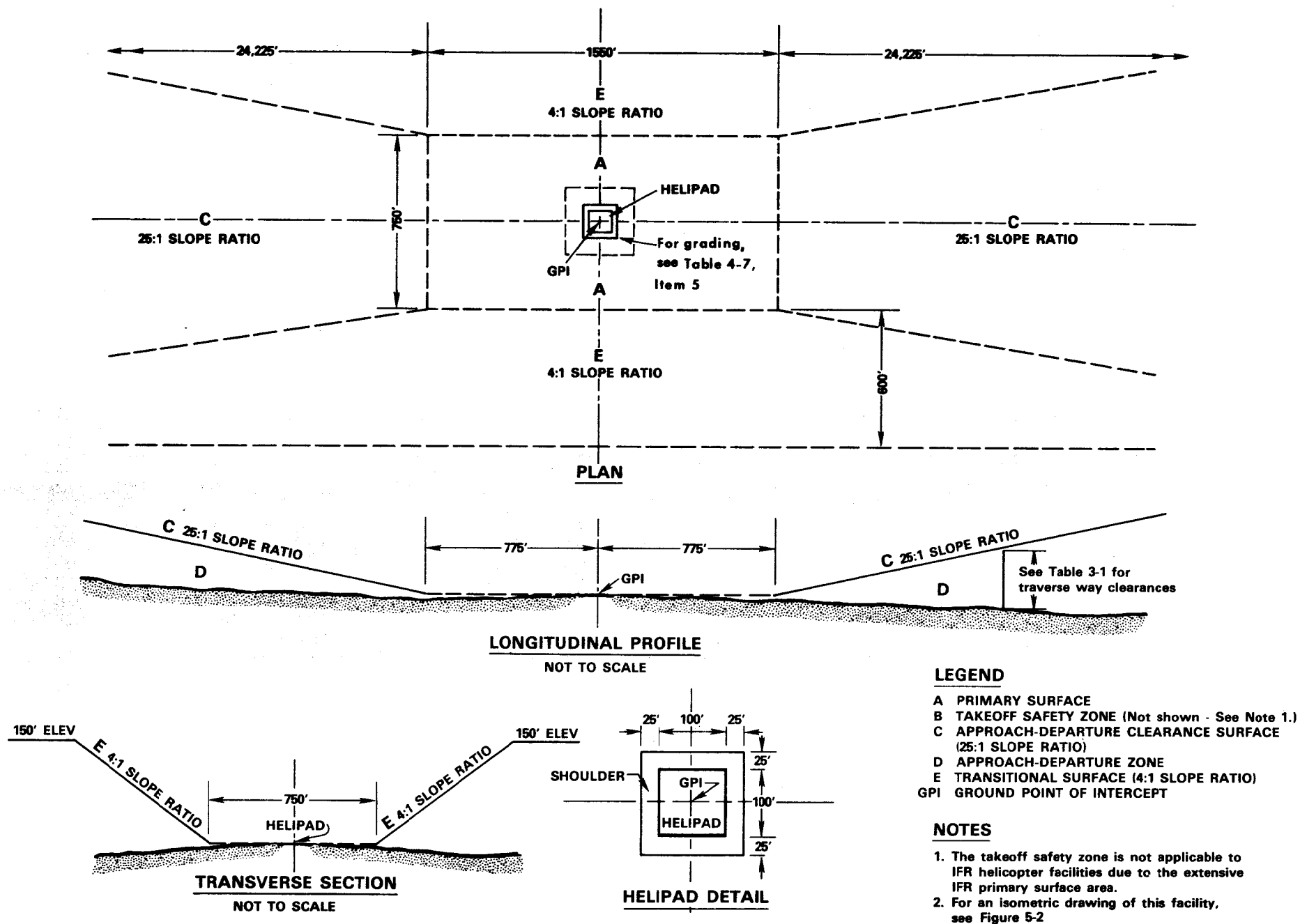


Figure 4-5. IFR Helipad.

Table 4-8. Helicopter Landing Lanes.

Item No.	Item Description	Requirement	Remarks
1	Length	1,600 ft. to 2,000 ft	Provide a number of equally spaced "touchdown" or holding points with adequate separation, usually not less than 400 feet from center to center. Multiple lanes are to be spaced a minimum of 200 feet from centerline to centerline of lanes.
2	Width	75 ft	
3	Shoulders		See table 4-4.

SECTION C-HELICOPTER LANDING LANES

4-8. General Information. At times there are situations at airfields or heliports when a high density of helicopters are parked on mass aprons. When this occurs, there is usually a requirement to provide landing and takeoff facilities that permit more rapid launch and recovery operations than otherwise can be provided by a single runway or helipad. This increased efficiency can be attained by providing one or more of the following, but is not necessarily limited to a:

- a. Multiple number of helipads or hoverpoints.
- b. Rotary-wing runway in excess of 800 feet in length.
- c. Landing lane.

4-9. Landing Lanes. Except for use as an autorotation lane, these lanes permit efficient simultaneous use by a number of helicopters (in most cases, up to four at one time) while additional helicopters are in a designated traffic pattern.

4-10. Identifying Touchdown Points. Multiple "touchdown" areas on landing lanes should be identified by numerical markings.

4-11. Layout Criteria. The principal dimensional criteria, and clearances for a landing lane layout are in table 4-8. These criteria are illustrated in figure 4-6.

SECTION D-HELICOPTER HOVERPOINTS

4-12. General Information. A hoverpoint is a prepared and marked surface used as a reference or control point for arriving or departing helicopters.

4-13. Layout Criteria. A hoverpoint consists of a paved area 30 feet in diameter, domed to a 6-inch height at the center. If a hoverpoint is established on existing pavement, the 6-inch dome need not be constructed. A typical layout of a hoverpoint is illustrated in figure 4-7.

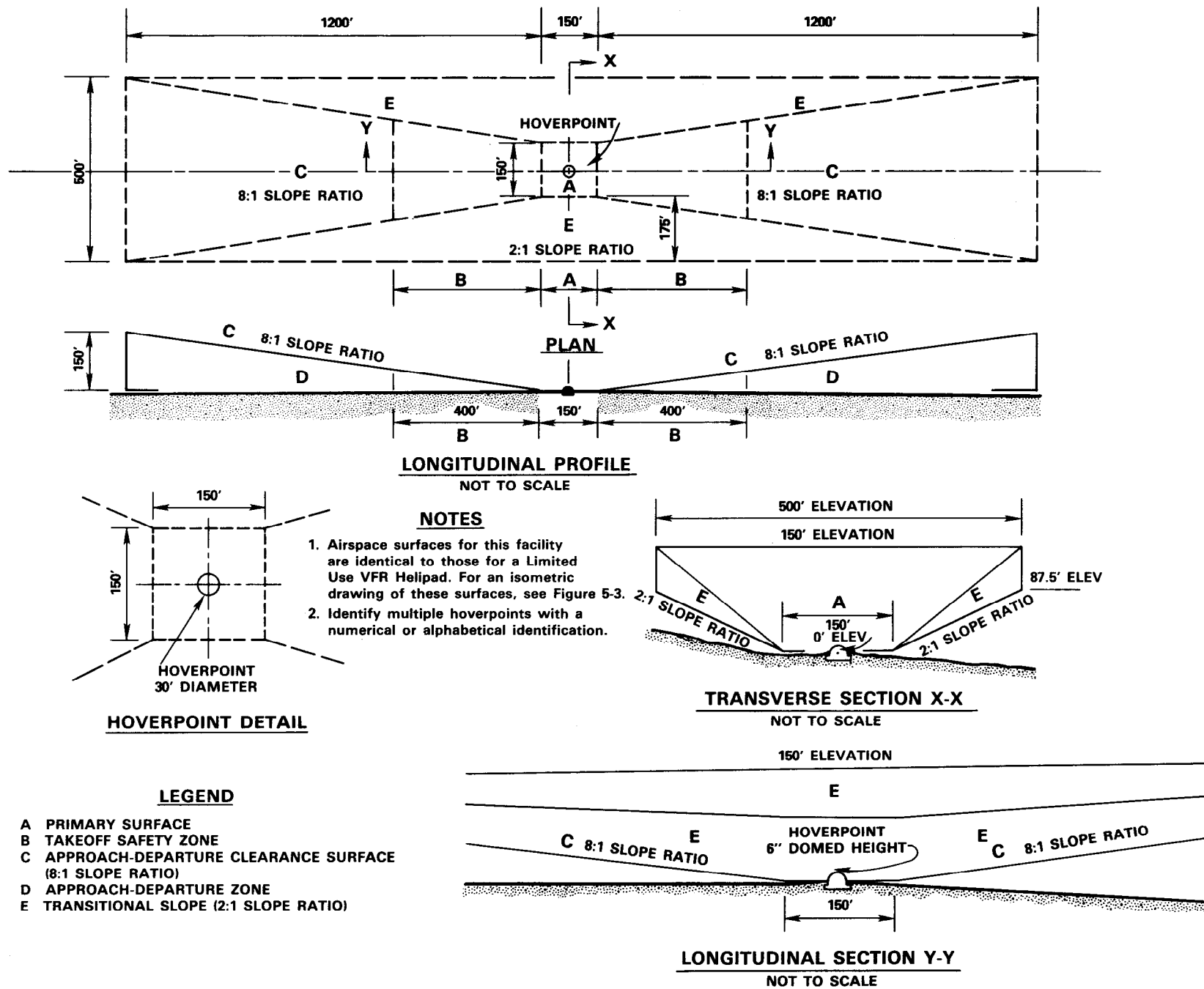


Figure 4-7. Helicopter Hoverpoint.

Chapter 5

HELIPORT AND HELIPAD AIRSPACE CRITERIA

SECTION A-OBSTRUCTIONS TO AIRSPACE

5-1. General Information. Standards for determining obstructions to air navigation for helicopter facilities are the same as the standards specified for fixed-wing aircraft facilities in chapter 3. The following airspace surfaces are illustrated in figures 5-1 through 5-3.

SECTION B-IMAGINARY SURFACES PERTAINING TO HELICOPTER RUNWAYS AND HELIPADS

5-2. Primary Surface. A horizontal plane symmetrically centered on the helicopter runway or helipad at the established elevation of the landing surface. The area beneath the primary surface (referred to as the primary surface area) must be free of obstructions except as noted in table 4-1, Item 6. The dimensions of the primary surface for the following facilities are:

Type Facility	Length	Width
VFR Runway	Runway length plus 75 ft at each end	300 ft
IFR Runway or Helipad	1,550 ft	750 ft
VFR Helipad	300 ft	300 ft
VFR Limited Use Helipad or Hoverpoint	150 ft	150 ft

5-3. Horizontal Surface (IFR). A circular level plane, located 150 feet above the established heliport or helipad elevation, defined by scribing an arc with a 4,600-foot radius from the ground point of intercept (GPI) of the runway or helipad.

5-4. Transitional Surfaces. Planes that connect the primary surface and the approach-departure clearance surface at a prescribed height. They may also join a horizontal surface at a prescribed horizontal distance beyond the limits of the horizontal surface. Each surface is outward and upward at a specified slope measured perpendicular to the runway centerline or helipad longitudinal centerline (or centerlines) extended.

a. **VFR facilities.** The slope ratio is 2 to 1. It rises to 150 feet above the established elevation of the landing surface.

b. **IFR facilities.** The slope ratio is 4 to 1. It rises 150 feet to the horizontal surface. At the intersection of the horizontal surface and the approach-departure clearance surface, it continues adjacent to the approach-departure clearance surface for the entire length, at which point an elevation of 375 feet above the approach-departure clearance surface is reached.

c. **VFR Limited-Use facilities.** The slope ratio is 2 to 1 rising from the primary surface until it reaches a dis-

tance of 250 feet from the centerline, it then rises vertically to an elevation of 150 feet above the established elevation of the landing surface.

5-5. Approach-Departure Clearance Surface (VFR). An inclined plane above the limits of the approach-departure zone, symmetrical about the runway or helipad longitudinal centerline extended. It starts at the end of the primary surface with the same width and at the established elevation of the landing surface. It extends outward and upward at a slope ratio of 8 to 1 until an elevation of 150 feet above the established helicopter runway or helipad elevation is reached. The outer width at the end of the 1,200 foot length is 600 feet, and it continues at this width until the minimum en route altitude is reached.

a. When the helicopter runway or helipad is collocated on a fixed-wing airfield, and the approach-departure zone ends within the limits of the horizontal surface of an airfield, the approach-departure clearance surface meets the airfield horizontal surface at a point 150 feet above the established airfield elevation.

b. When helicopter facilities are located separately, from fixed-wing runways, the approach-departure clearance surface extends horizontally to the limits of that surface and then continues on an 8 to 1 slope ratio until minimum en route altitude is reached.

5-6. Approach-Departure Clearance Surface (Limited Use Helipads). This surface is similar to the approach-departure clearance surface for a VFR helicopter runway or helipad, except for the inner and outer widths.

5-7. Approach-Departure Clearance Surface (IFR). This is an inclined plane above the limits of the approach-departure zone, symmetrical about the helicopter runway or helipad longitudinal centerlines extended. It begins at the end of the primary surface, with the same width and at the established elevation of the landing surface. It extends outward and upward at a slope ratio of 25 to 1 for a horizontal distance of 24,225 feet. The width at the outer end of the approach-departure clearance surface is 8,000 feet.

SECTION C-IMAGINARY SURFACES THAT PERTAIN TO HELICOPTER HOVERPOINTS

5-8. Criteria for Imaginary Surfaces. The width of the primary surface and layout criteria for approach-departure zones and transitional surfaces are the same as specified for a VFR limited use helipad.

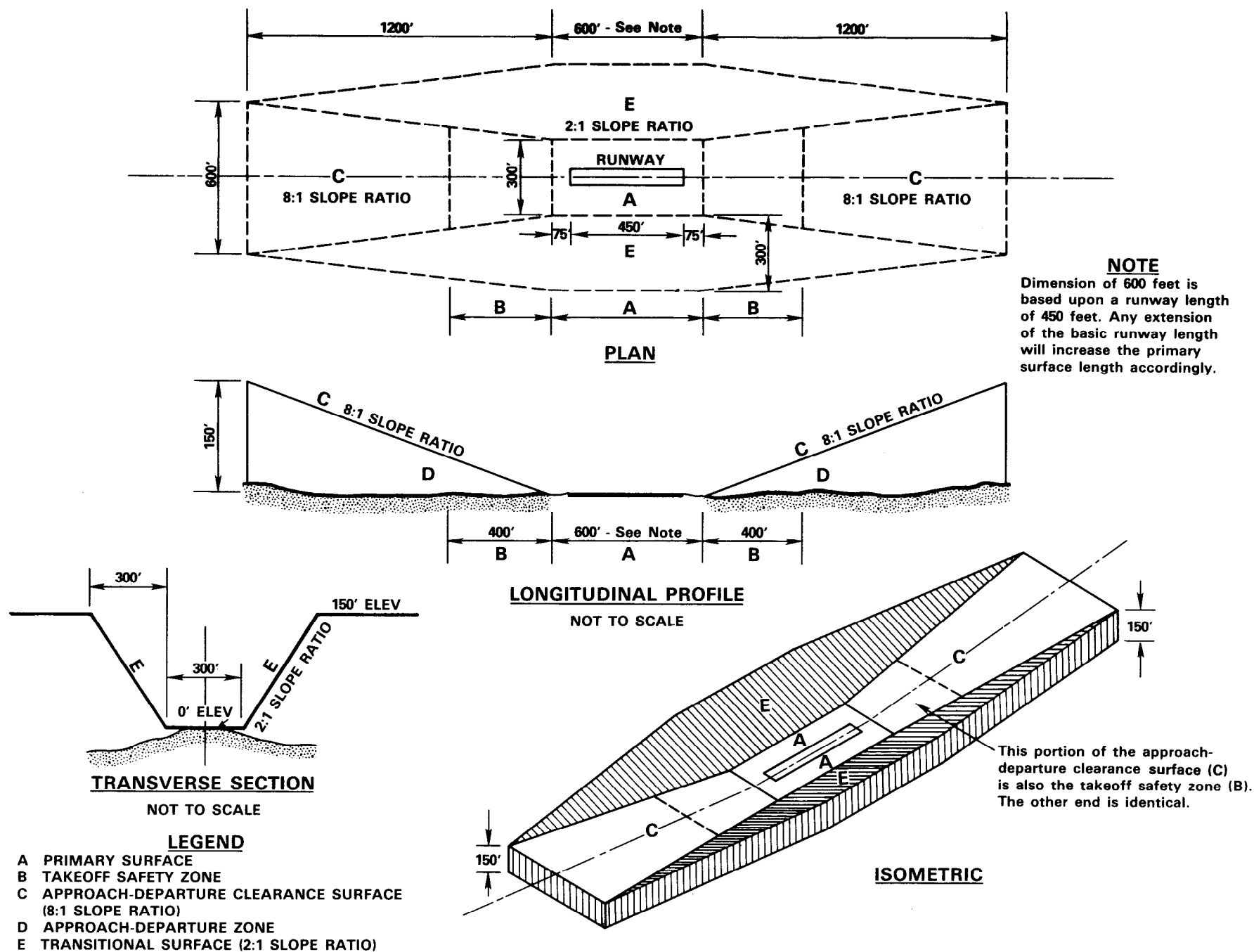


Figure 5-1. Airspace Imaginary Surfaces-Helicopter VFR Runway.

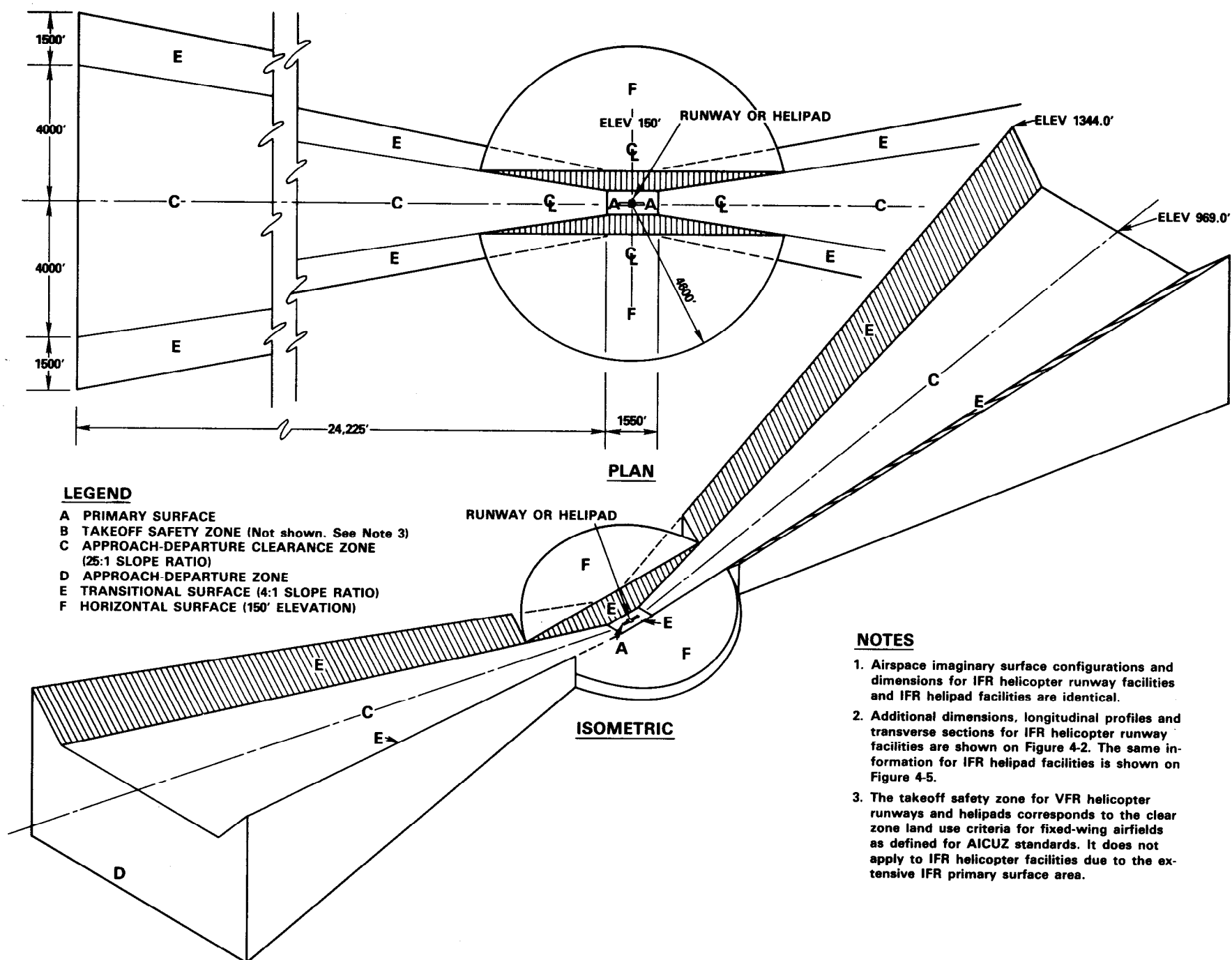


Figure 5-2. Airspace Imaginary Surfaces-Helicopter IFR Runway and Helipad.

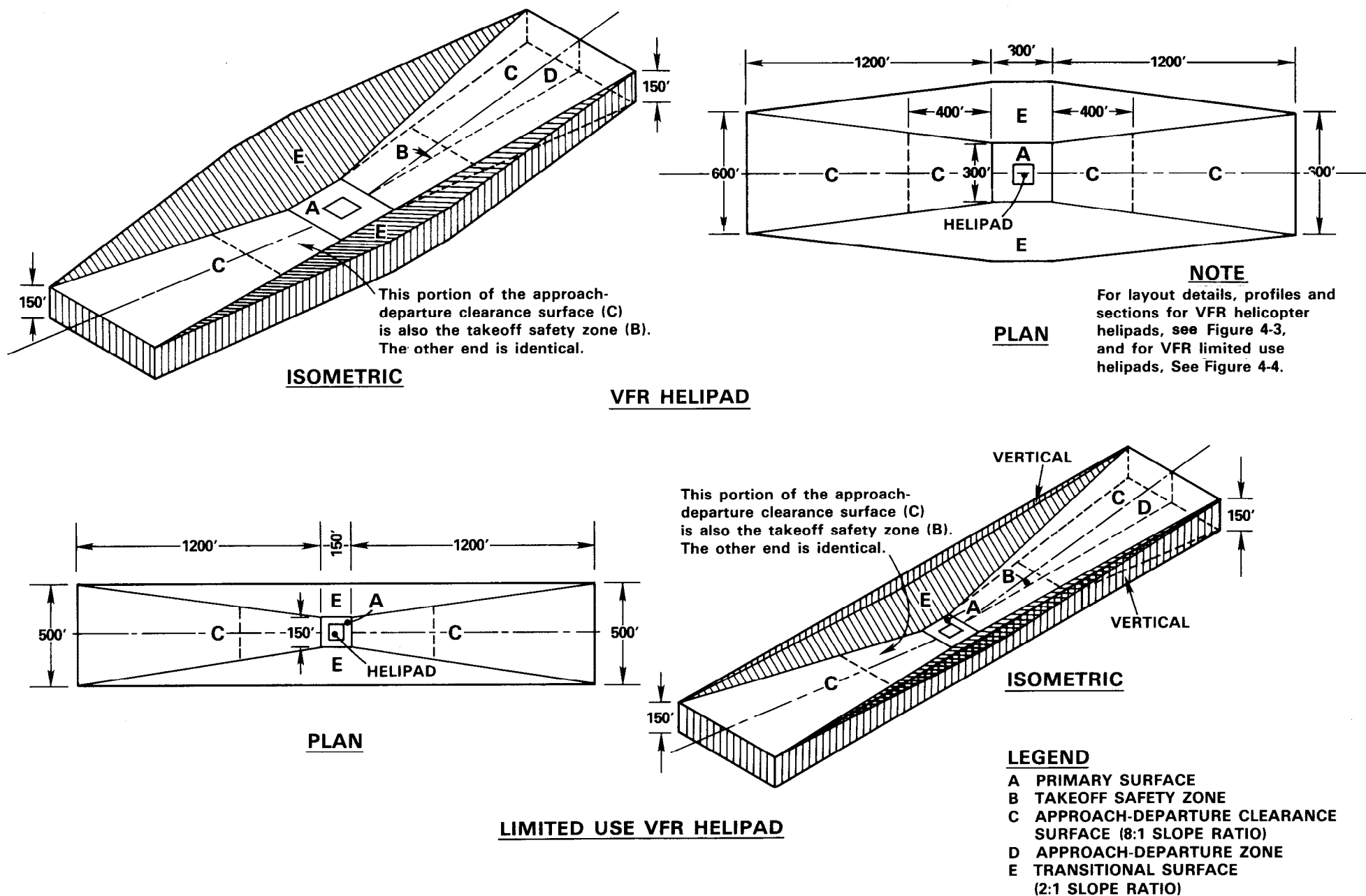


Figure 5-3. Airspace Imaginary Surfaces—VFR Helipad and Limited Use VFR Helipad.

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SUMMARY OF CHANGES

This revision replaces chapters 1, 2, 3 and 6 of AFM 86-8 and augments TM 5-803-4. For AFM 86-8, it is expanded to include criteria for Class A runways, which are primarily intended for light aircraft. For TM 5-803-4, it is expanded to include criteria for Class B runways which accommodate all other fixed-wing aircraft. Criteria and guidance on Air Installation Compatible Use Zones (AICUZ) for both runways are provided.

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GLOSSARY

AICUZ (Air Installations Compatible Use Zones). (1) Land areas on which certain uses may obstruct the airspace or otherwise be hazardous to aircraft operations, and (2) land areas that are exposed to the health, safety, or welfare hazards of aircraft operations.

Accident Potential Zone I (APZ I). The area beyond the clear zone that possesses a significant potential for accidents.

Accident Potential Zone II (APZ II). The area beyond APZ I that has a measurable potential for accidents.

Airfield. An area prepared for the accommodation (including any buildings, installations, and equipment), landing, and takeoff of aircraft.

Airfield, Heliport, or Helipad Elevation. The established elevation, in terms of the nearest foot above mean sea level, of the highest point of the usable landing area.

Airfield Reference Point. The designated geographical location of an airfield. It is given in terms of the nearest second of latitude and longitude. The position of the reference point must be as near to the geometric center of the landing area as possible, taking future development of the airfield into account.

Apron. A designated area on an airfield intended to accommodate aircraft for loading or unloading passengers or cargo, refueling, parking, or maintenance.

Autorotation Lane. A helicopter landing lane or designated area on a runway used for practicing landings under simulated engine failure or certain other simulated emergency conditions.

Approach-Departure Clearance Surface. Defined in paragraph 3-4c (for airfields) and paragraph 5-5 (for heliports and helipads).

Approach-Departure Clearance Zone. An area on ground or water located beneath the approach-departure clearance surface. The boundaries are identical to the horizontal dimensions of the approach-departure clearance surface.

Clear Zone Surface. Defined in paragraph 3-4b (for fixed-wing facilities) and tables 4-6 and 4-7 (for rotary-wing facilities).

Conical Surface. Defined in paragraph 3-5b.

Fixed-Wing Aircraft. A powered aircraft that has wings attached to the fuselage so that they are either rigidly fixed in place or adjustable, as distinguished from aircraft with rotating wings, like a helicopter.

Glide Path. The line to be followed by an aircraft as it descends from horizontal flight to land upon the surface. Also called glide slope.

Glide Slope. Same definition as for glide path.

Grade. Also gradient. A slope expressed in percent of feet per hundred. For example, 0.5 percent means a 0.5-foot slope in 100 feet.

Ground Point of Intercept (GPI). A point in the vertical plane of the runway centerline or center of a helipad at which it is assumed that the straight line extension of the glide slope intercepts the approach surface baseline.

Helicopter. An aircraft deriving both lift and control from one or more power driven rotors rotating on substantially vertical axes.

Helipad. A prepared area designated and used for the takeoff and landing of helicopters.

Heliport. A facility designated for operating, basing, servicing, and maintaining helicopters.

Heliport or Helipad Elevation. See airfield elevation.

Hover. A term applied to helicopter flight when the aircraft: (1) Maintains a constant position over a selected point usually within "ground-effect" (3 to 10 feet above ground), and (2) Is taxiing (airborne) (3 to 10 feet above ground) from one point to another.

Hoverlane. A designated aerial traffic lane for the directed movement of helicopters between a helipad or hoverpoint and the servicing and parking areas of the heliport or airfield.

Hoverpoint. A prepared and marked surface at a heliport or airfield used as a reference or control point for arriving or departing helicopters.

Instrument Flight Rules (IFR). Rules that govern the procedure for conducting instrument flight.

Inner Horizontal Surface. Defined in paragraph 3-5a.

Landing Lane. One of four to six parallel surfaced lanes at a stage field, used for landing, takeoff, and autorotation training. Except for the autorotation lane, these lanes permit efficient simultaneous use by more than one helicopter. A single landing lane may sometimes be established at an airfield or helipad in order to support a high density of helicopters parked on a mass apron. (See paragraph 4-9 and figure 4-6.)

Limited Use Helipad. A VFR facility, sited to support only occasional operations at special locations such as hospitals, headquarters buildings, missile sites, and similar situations. Other locations include airfields where one or more helipads may be required for separating operations of numerous small helicopters (OH, UH and AH type aircraft) from fixed-wing or medium and heavy helicopter traffic.

Limited Use Runway. A runway for which standard runway clearances cannot be obtained, but due to mission requirements for low density air traffic under VFR, it is essential to provide a minimum type operating facility. See Army manual TM 5-803-4 and Navy document NAVFAC P-80.

Noninstrument Runway. A runway intended for operating aircraft that use visual flight rules.

Obstacle. A natural or manmade object that violates airfield or heliport clearances, or projects into imaginary airspace surfaces.

Obstacle Clearance. The vertical distance between the lowest authorized flight altitude and a prescribed surface within a specified area.

Outer Horizontal Surface. Defined in paragraph 3-5c.

Primary Surface (Airfield). Defined in paragraph 3-4a.

Primary Surface (Heliport or Helipad). Defined in paragraph 5-2.

Runway. A designated rectangular area, on an airfield or heliport prepared for the landing and takeoff run of aircraft along its length.

Runway (Class A). Explained in paragraph 2-1. A list of aircraft that determine the classification of a Class A runway is in table 2-1.

Runway (Class B). All runways other than Class A runways, for example, runways that accommodate heavy aircraft or have the potential for development to heavy aircraft use. A list of aircraft that determine the classification of a Class B runway is in table 2-1.

Runway End. As used in this document, the runway end is the end of a runway where a normal threshold is located. When the runway has a displaced threshold, the using Service will evaluate each individual situation and, based on this evaluation, will determine the point of beginning for runway and airspace imaginary surfaces.

Runway Approach Threshold. The beginning of that part of the runway usable for landing airplanes.

Shoulder. An area adjacent to the edge of an operational pavement so prepared as to keep the probability of serious damage to an aircraft to a minimum in case it runs off the operational area.

Slope Ratio. A slope expressed in feet as a ratio of the horizontal to the vertical distance. For example, 50:1 means 50 feet horizontally to 1 foot vertically.

Takeoff Safety Zone. A clear graded area within the limits of the first 400 feet of the approach-departure zone of all VFR rotary-wing facilities. The land use of this area is comparable to the clear zone area applied to fixed-wing facilities.

Taxilane. A designated path through parking, maintenance or hangar aprons, or on the perimeter of such aprons to permit the safe ground movement of aircraft operating under their own power.

Taxiway. A designated path, on an airfield or heliport other than apron areas, selected or prepared for taxiing aircraft.

Towlane. A prepared path for towing aircraft. It provides minimum lateral clearance and is generally located on an airfield or heliport. It may be a connecting route between airfield or heliport facilities and an aircraft supporting facility nearby.

Touchdown Point. A designated location on a landing lane, taxiway, or runway for permitting more rapid launch or recovery of helicopters in a high density area.

Transitional Surfaces. Defined in paragraph 3-5d (for fixed-wing facilities) and paragraph 5-4 (for rotary-wing facilities).

Visual Flight Rules (VFR). Rules that govern the procedures for conducting flight under visual conditions.

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TM 5-803-4, Planning of Army Aviation Facilities
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TM 95-226, United States Standard for Terminal Instrument Procedures (TERPS)

Navy

NAVFAC DM-21, Design Manual, Airfield Pavements
NAVFAC P-272, Definitive Designs for Naval Shore Activities
NAVFAC P-80, Facility Planning Factor Criteria for Navy and Marine Corps Shore Installations volume 1 - Category Code Series 100 through 200
OPNAV Inst. 3722.16C, United States Standard for Terminal Instrument Procedures (TERPS)
OPNAV Inst. 11010.36, Air Installations Compatible Use Zone (AICUZ) Programs

Air Force

AFM 11-1, volume I, US Air Force Glossary of Standardized Terms
AFM 55-9, United States Standard for Terminal Instrument Procedures (TERPS)
AFM 86-2, Standard Facility Requirements
AFM 86-8, Airfield and Airspace Criteria
AFM 88-6, Chapter 1, General Provisions for Airfield Designs

AFM 88-14, Visual Air Navigation Facilities
AFM 88-15, Air Force Design Manual-Criteria and Standards of Air Force Construction
AFR 19-9, Interagency and Intergovernmental Coordination of Land, Facility and Environmental Plans, Programs and Projects
AFR 55-2, Airspace Management
AFR 60-11, Aircraft Operation and Movement on Ground or Water
AFR 60-27, Flying Instrument Procedures
AFR 88-16, Standards for Marking Airfields

Other

CG 318, United States Standard For Terminal Instrument Procedures (TERPS)
Department of Defense Instruction 4165.57, Air Installations Compatible Use Zones
Federal Aviation Administration, Advisory Circular 150/5300-4A, Utility Airports
FAA Handbook 8260.3B, United States Standard For Terminal Instrument Procedures (TERPS)
Federal Aviation Regulation volume XI part 77, Objects Affecting Navigable Airspace
ICAO Annex 14, International Standard and Recommended Practices
ICAO Doc 7920-AN/865/2 part 2, Aerodrome Physical Characteristics
JCS Pub 1, Department of Defense Dictionary of Military and Associated Terms

**DEPARTMENT OF DEFENSE
LAND USE COMPATIBILITY GUIDELINES FOR CLEAR ZONE
AND ACCIDENT POTENTIAL ZONES**

Land Use Category	Compatibility ¹		
	Clear Zone	APZ I	APZ II
Residential			
Single family	NO	NO	YES ²
2-4 family	NO	NO	NO
Multifamily dwellings	NO	NO	NO
Group quarters	NO	NO	NO
Residential hotels	NO	NO	NO
Mobile home parks or courts	NO	NO	NO
Other residential	NO	NO	NO
Industrial and Manufacturing ³			
Food and kindred products	NO	NO	YES
Textile mill products	NO	NO	YES
Apparel	NO	NO	NO
Lumber and wood products	NO	YES	YES
Furniture and fixtures	NO	YES	YES
Paper and allied products	NO	YES	YES
Printing, publishing	NO	YES	YES
Chemicals and allied products	NO	NO	NO
Petroleum refining and related industries	NO	NO	NO
Rubber and miscellaneous plastic goods	NO	NO	NO
Stone, clay, and glass products	NO	YES	YES
Primary metal industries	NO	YES	YES
Fabricated metal products	NO	YES	YES
Professional, scientific and controlling instruments	NO	NO	NO
Miscellaneous manufacturing	NO	YES	YES
Transportation, Communications and Utilities ⁴			
Railroad, rapid rail transit (on-grade)	NO	YES ⁴	YES
Highway and street rights-of-way	YES ⁵	YES	YES
Auto parking	NO	YES	YES
Communication	YES ⁵	YES	YES
Utilities	YES ⁵	YES ⁴	YES
Other transportation, communications and utilities	YES ⁵	YES	YES
Commercial and Retail Trade			
Wholesale trade	NO	YES	YES
Building materials (retail)	NO	YES	YES
General merchandise (retail)	NO	NO	YES
Food-retail	NO	NO	YES
Automotive, marine, aviation (retail)	NO	YES	YES
Apparel and accessories (retail)	NO	NO	YES
Furniture, homefurnishing (retail)	NO	NO	YES
Eating and drinking places	NO	NO	NO
Other retail trade	NO	NO	YES
Personal and Business Services ⁶			
Finance, insurance and real estate	NO	NO	YES
Personal services	NO	NO	YES
Business services	NO	NO	YES
Repair services	NO	YES	YES
Professional services	NO	NO	YES
Contract construction services	NO	YES	YES
Indoor recreation services	NO	NO	YES
Other services	NO	NO	YES
Public and Quasi-Public Services			
Government services	NO	NO	YES ⁶
Educational services	NO	NO	NO

Land Use Category**Compatibility ¹**
Clear Zone APZ I APZ II

Cultural activities	NO	NO	NO
Medical and other health services	NO	NO	NO
Cemeteries	NO	YES ⁷	YES ⁷
Non-profit organizations including churches	NO	NO	NO
Other public and quasi-public services	NO	NO	YES

Outdoor Recreation

Playground's neighboring parks	NO	NO	YES
Community and regional parks	NO	YES ⁸	YES ⁸
Nature exhibits	NO	YES	YES
Spectator sports including arenas	NO	NO	NO
Golf course ⁹ , riding stables ¹⁰	NO	YES	YES
Water based recreational areas	NO	YES	YES
Resort and group camps	NO	NO	NO
Entertainment assembly	NO	NO	NO
Other outdoor recreation	NO	YES ⁸	YES

Resource Production & Extraction and Open Land

Agriculture ¹¹	YES	YES	YES
Livestock farming, animal breeding ¹²	NO	YES	YES
Forestry activities	NO	YES	YES
Fishing activities and related services ¹³	NO ¹⁴	YES ¹³	YES
Mining activities	NO	YES	YES
Permanent open space ¹³	YES	YES	YES
Water areas	YES	YES	YES

Footnotes

1. A "Yes" or "No" designation for compatible land use is to be used only for gross comparison. Within each, uses exist where further definition may be needed as to whether it is clear or usually acceptable/unacceptable owing to variations in densities of people and structures.
2. Suggested maximum density 1-2 dwelling units per acre, possibly increased under a Planned Unit Development where maximum lot covered less than 20 percent.
3. Factors to be considered: Labor intensity, structural coverage, explosive characteristics, air pollution.
4. No passenger terminals and no major above ground transmission lines in APZ I.
5. Not permitted in graded area, except as noted in table 2-7.
6. Low intensity office uses only. Meeting places, auditoriums, etc., not recommended.
7. Excludes chapels.
8. Facilities must be low intensity.
9. Clubhouse not recommended.
10. Concentrated rings with large classes not recommended.
11. Includes livestock grazing but excludes feedlots and intensive animal husbandry.
12. Includes feedlots and intensive animal husbandry.
13. Includes hunting and fishing.
14. Controlled hunting and fishing may be permitted for the purpose of wildlife control.